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ENGRAVINGS
OF THE
BONES, MUSCLES, AND JOINTS.

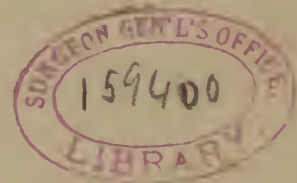
ENGRAVINGS
OF THE
BONES, MUSCLES AND JOINTS,

BY JOHN BELL, SURGEON.

PART FIRST.

CONTAINING
ENGRAVINGS OF THE BONES.

THE FIRST AMERICAN FROM THE SECOND LONDON EDITION.



PHILADELPHIA:
PUBLISHED BY ANTHONY FINLEY.

William Fry, Printer.

1817.



TO
DR. DANIEL RUTHERFORD,
PROFESSOR OF MEDICINE AND BOTANY,
AND
PHYSICIAN TO THE ROYAL INFIRMARY,
EDINBURGH.

SIR,

IN presenting this Book of Plates to one who is so well able as you are to judge of their defects, I ought to add some value to the offering by declaring the motives of it.—It is a mark of gratitude for the friendly care with which, in company with my worthy Master, you watched over me during a long and dangerous illness. Perhaps there can be no higher compliment betwixt medical men, than this confidence in time of sickness; and surely, if I may judge from my own feelings, nothing can be more grateful than the remembrance of kindnesses bestowed at such a time.—May your skill be long useful to your fellow-citizens; and may it be always valued as I value it.

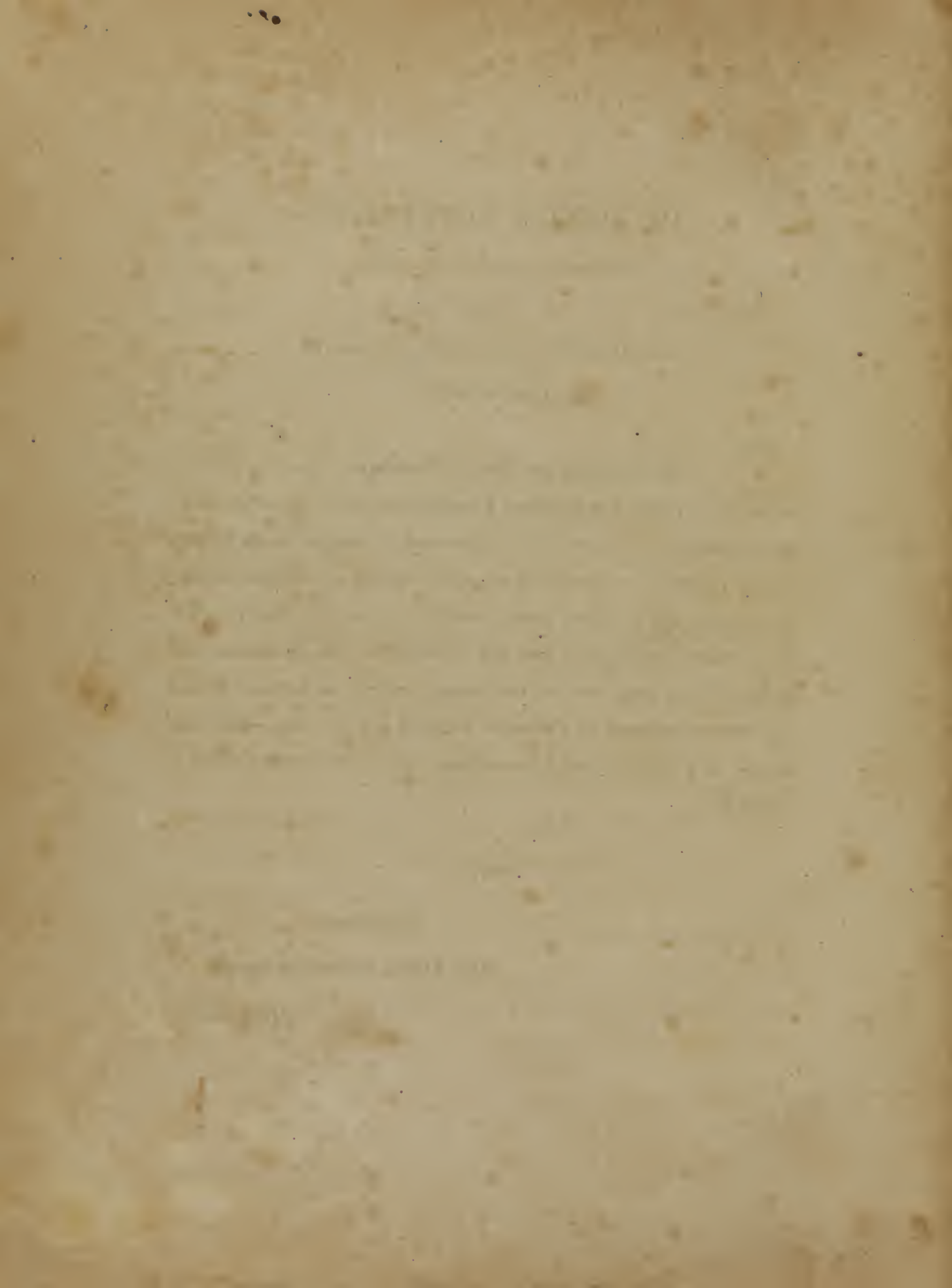
I am,

SIR,

With respect,

Your Friend, and Humble Servant,

JOHN BELL.



P R E F A C E.

WHEN a young man, who had been blind from his childish years, had his sight restored to him by our celebrated surgeon CHESSELDEN, all his thoughts, and feelings, and pleasures, and pains, were very interesting to his friends; for that most delightful of all our senses was to him as a dream of fairy visions, confused, yet delightful, beyond all that the fancy can conceive.

“ He was like one newly born into the world, needing to learn anew all the
“ objects around him, knowing nothing by the eye, but all by the touch.
“ It was long before he found out that pictures represented solid bodies,
“ and then he was much surprised that those things, which to the eye
“ seemed prominent and round, were to the touch quite even and flat; he
“ asked his friends which was indeed the lying sense, feeling or seeing.”

“ Being shown his father’s picture in a locket, at his mother’s watch, and
“ told what it was, he acknowledged a likeness, but was vastly surprised;

asking

“ asking, how it could be that a large face could be expressed in so little
“ room; saying, it should have seemed as impossible to him, as to have put
“ a bushel of any thing into a pint.”

Now there are many, who having enjoyed and used this precious sense during all their lives, have never come to know, like this young man, that, even within the narrowest circle, the representation is as perfect and true, as in the full size of the human body; foolishly imagining that nothing can be drawn but of its natural size. If a man were to take this fancy, that nothing of anatomy could be drawn but of the full size of life, with what high contempt must he look down upon these little plates; where I have endeavoured to represent, in this miniature form, what it must be confessed, might be more fully represented on a larger scale: and yet I am sensible, that those, who cannot understand these plates, will hardly profit even by that stately anatomical figure of full six feet high, which, being cut in copper, with googes, and chissels, and mallets, and all kinds of instruments, must establish a reputation for its author; which, if not high, will not fail to be at least of a lasting kind; neither apt to be forgotten, nor liable, like other discoveries, to go astray.

“ As I proceeded in writing a book of anatomy, I felt more and more at
“ every step, the necessity of giving plates to it;” for a book of anatomy without these seemed to me no better than a book of geography without its maps; it was, in my mind, like teaching mathematics without diagrams, or
solving

solving Euclid's problems without the helps of figures or lines, by the mere force of imagination alone. Indeed any one, who, studying without some help of plates, tries to understand and to remember an anatomical description with no other representation than words merely, will feel, that he is like one attempting to work a rule of arithmetic without the use of cyphers, trying to remember the value and denomination of each part throughout the whole train of numbers; he is ingenious in difficulties, making an abstract subject of one belonging to the senses chiefly, and attempting to obtain by words, those ideas which must come to him only through the eye.

It was while I was writing anatomical descriptions that I first thought of drawings, and of placing my subjects in those very shapes and postures in which they were explained:—and I conceived, that the descriptions and the drawings might thus be wrought into one perfect whole; being as two parts of one idea, or as one idea presented in a double form, once to the eye, and once again to the ear. If, in any material points, my drawings and descriptions shall thus agree, then must the ideas be made out to my reader clear and fair; and should insinuate themselves into his mind without labour or thought on his part; while he is not toiling from descriptions to drawings; not harassed with continual interruptions, incongruous ideas, parts described but not represented, or represented and not described; not travelling far and wide from the ideas of one author, to the representation of another; never trying to associate ideas which have no affinity, nor striving to bring drawings and descriptions together, which are as far, as may be, from being

parts of the same idea, or from being capable of that close comparison which the student seeks, and misses with a disappointment which is continually renewed. Such must be the student's labour, (a labour which might well oppress the most active mind,) if the teacher be not careful to preserve for him this correspondence of ideas; whether he be employed in comparing his lecture with the subject lying before him, or his drawings with his book.

From the first dawnings of anatomical knowledge, or at least from the very earliest invention of anatomical plates, this vitious practice has prevailed, that each author, careless of this correspondence of ideas; never thinking of the harmony that ought still to subsist between those notions which are to be conveyed by words, and those which speak to the eye, in the truer language of this subject; intending merely to write a book, and rather with the hopes of procuring himself a name, than with the prouder expectation of multiplying and varying the sources of instruction, writes his book after his own way; and takes his plates, perhaps, where he is directed by his bookseller, or where he may most safely steal; and often choosing them of a fashion fifty years older than that book, into the gaps and interstices of which, they are to be nitched and stuck up, wherever they will make the handsomest figure, not where they will be of the most use.

This ironical praise may be very safely given to the older anatomists for their love of original drawings, that having once set their taste to one certain system of plates, they have been very constant and true to their first choice.

It

It is thus that the plates of Vesalius, Fallopius, or Eustachius, have descended, with some distortions and abridgments indeed, but still unpolluted with any stain of originality, nor vitiated by any one improvement of representation or of thought, through the books of Vidus Vidius, Pareus, Stephanus, Blanchardus, Veslingius, Riolanus, Verhein, Palfin, Dionis, and a thousand others. Thus have the once beautiful plates of Vesalius, (mangled and deformed, cut down to suit books of all sizes, twisted and accommodated to all subjects and all forms of explanation,) descended to us in such distorted shapes, that while we are looking over their books to fix upon them this indictment of plagiarism, we can hardly recognise the original drawings so fairly as to prove the deed.

Even in the first invention of our best anatomical figures, we see a continual-struggle between the anatomist and the painter; one striving for elegance of form, the other insisting upon accuracy of representation. It was thus that the celebrated Titian consented to draw for Vesalius: though it is but too plain that there can be no truth in drawings, thus monstrously compounded betwixt the imagination of the painter, and the sober remonstrances of the anatomist, striving for accurate anatomy, where the thing cannot be; for those figures, which are supposed to be drawn truly from the anatomical table, are formed from the imagination of the painter merely; sturdy and active figures, with a ludicrous contrast of furious countenances, and active limbs, combined with ragged muscles, and naked bones, and dissected bowels, which they are busily employed in supporting, forsooth, or even demonstrating

strating with their hands. This vitious practice of drawing from imagination merely is well exemplified in this, that anatomists have, with one consent, agreed to borrow the celebrated Torso for putting their bowels into, to explain them there; a practice which has descended from the time of Vesalius down to Chesselden, and from him to the systems of the present day.

No painter in natural history, in botany, in mechanics, nor in any thing that relates to science, would dare to draw without his subject immediately before him: but anatomists, who most of all need this clearness and truth, have been most of all arbitrary and loose in their methods; not representing what they saw, but what they themselves imagined, or what others chose to report to them:—hence the careless copying from book to book, the interpolations of anatomists, the interference of painters in a subject degrading to their higher art, the errors and mistakes of engravers, and the subjection of true anatomical drawing to the capricious interference of the artist, whose rule it has too often been to make all beautiful and smooth, leaving no harshness nor apparent blur in all his work. Even the celebrated book of Albinus has been thus abused; and though he is sparing of cellular substance, and glands, and fat, and vessels; of all that gives a drawing its likeness to the human body; even the little that he had given, is now rounded down into the smoothness of ivory, as if a model had been made and drawn from. Albinus, (naturally sparing of ornament, and wanting in the natural character of parts) lived to see his drawings thus robbed of the little that they possessed of grace or nature; and then produced, as if in mere wantonness

tonness and sport, under the high title of *ANATOMY of PAINTING*; but by one, who seems too grave to have intended any stroke of irony, so refined as this.

A higher taste prevails in the present age; and the splendid and noble works of Morgagni, Haller, Bidloo, and Albinus, and of Chesselden, Hunter and Cowper, are drawn truly, and from nature, and cannot be forgotten, while anatomy and the arts depending on it, continue to be esteemed. Yet even, among those great men, we have seen an idea gradually improving, till at last it was brought by Haller to the true point. For Albinus's drawings are merely plans: Bidloo's tables are beautiful and masterly; but being wanting in regularity and order, they want altogether the clearness of a plan: Haller's drawings are as fair as Bidloo's, as regular as those of Albinus; and combine in one the truth and sometimes the elegance of drawing, with the plainness and accuracy of a mere plan.

If an anatomist shall set up a skeleton, and draw it in postures resembling those of life; if he shall dissect the human body, studying and drawing it in parts; if he shall continue drawing muscle after muscle, and one part after another, till he have gone through the whole; if he shall proceed then to take these drawings and notes of individual parts, and lay them over his first drawings of the bones; if he shall try to match the parts belonging to fifty individual bodies of different sizes, of various forms, dying, some suddenly, and others slowly, some full and muscular, others emaciated

emaciated and poor; what will the result of all this be, but a mere plan? It is a plan merely, through all the process, and in all its parts; it cannot be other than a plan when the whole work is accomplished and set up. It was an unlucky theory of this kind that carried the great ALBINUS, for fifteen years, through a course of laborious dissections, painful and useless to himself; but useful to all those who have to follow him: Still each drawing of his is but a mere plan, resembling no individual body, resembling in nothing the general drawing of the body; it is such a view as never is to be seen in a dissection. It is not, like our COWPER's nor like BIDLOO's, a true drawing of muscles dashed with touches of glands, and fat, and cellular substance, which are the natural distinctions of parts; nor mixed with the branchings of arteries or nerves, the chief objects for which we study the muscles; but it is like a statue anatomised, where all the irregularities of substance, all the gradations of bones, ligaments, tendons, and flesh, are rounded down with a studied smoothness; it is a figure which the student can never compare with the body as it lies before him for dissection; it is a figure suiting more the eye of the painter than the eye of the anatomist; nor even pleasant to his eye, since it stands in attitudes, which no swelling of particular muscles seems to support.

In the other extreme is BIDLOO; for, in his plates, the master-hand of the painter prevails almost alone; while whole sheets of infinite labour serve only to explain the joinings of the clavicles, or perhaps the form of one trifling muscle or gland. The formal figures of ALBINUS are more desirable than

than these. But, in either book, we regret either extreme; in ALBINUS we think that we understand every muscle of human body! but our knowledge hardly bears the test of dissection; the drawings and the subject never can be directly compared:—In BIDLOO, we have the very subject before us! the tables, the knives, the apparatus, down even to the flies that haunt the places of dissection, all are presented with the main object of the plate; and thus we have perfect confidence in the drawing; in which also the parts are laid out in a bold and masterly stile, so that the dead subject and the engraving can well bear to be compared. But in BIDLOO there is often no classification nor arrangement, no breadth of parts, by which we can understand a whole limb; a thigh is presented with no one marked point; neither the haunch nor the knee are seen: His plates are all elegance in respect of drawing; in respect of anatomy, they are all disorder and confusion; and one must be both anatomist and painter to guess what is meant, how the limb is laid, and what parts are seen.

It is to HALLER that we must give the palm; who having to do with parts chiefly, and not with a whole, has seldom offended by drawing a dissected body, after a living form; nor by planning and dividing a living form into the parts of a dissected body; but has given his drawings truly from the anatomical table; and with the truest drawing, has given, very often, all the distinctness of a plan.

Now we should always remember that anatomy is to be learnt only by
dissection;

dissection;* dissection is the first and last business of the student; and when drawings are made for his use the body should be laid out, as he is to order it in dissection; the belly should be displayed, as he can display it in his subject; an arm should be so drawn, that, when he dissects the arm of the subject, it may fall naturally upon the table, exactly as he finds it in his book; and still the posture of arms, and legs, and heads, should be preserved distinct and clear: enough of the general figure should be kept to explain the posture of parts; there should be kept up a natural correspondence among the several drawings; and while the true anatomical drawing is deli-

* If anatomy is to be acquired in this way only, then must we understand by a school of anatomy a school of dissection: Yet those who have had the happiness of prosecuting their studies in foreign universities, or in the London schools, will hardly believe it, that there is at least one place of education much celebrated, and worthy to be so, where the study of anatomy is denied or proscribed.—Where not only it is not praiseworthy, but even dangerous to propose dissections; where the man who may be so bold as to do his duty in that most important study, shall be traduced in filthy pamphlets, thrust officiously, and with intentions not of the purest kind, into the hands of every young man who comes to school. If I have felt this, it has been still in silence; till I now speak of it, not formally, but by chance; not with the mean thought of presenting myself as a persecuted man, nor of indulging a resentment which were lost upon such people, or upon such an occasion; but to make my acknowledgments to one, whose generous conduct is not unknown; who is truly interested in the honour and reputation of that university to which he belongs; who is at once an honour and defence to it; and whose single praise, (may I be allowed to say what touches myself so nearly,) “shall outweigh a whole theatre of others.”

vered

vered upon one plate, a plan, if it be required, should be added upon the next.

I know but too well that few will submit to learn anatomy, as they should do, by the dry reading of anatomical descriptions, and the tedious comparing of these with the subject, or with their plates; and there are very few, who have learned this useful truth, that they are to become acquainted with parts only by being masters of the whole. One proposes to himself to learn the bones only; another designs to attend chiefly to the joints; a third will study the arteries only, "for the arteries are of chief use to the surgeon;" another delights in studying the viscera, and is sorely disappointed if he fail to understand the brain; while anatomy absolutely is not to be studied in parts, but is one fair and continued circle, where such is the correspondence, and mutual connection of all the parts, that he who would know the muscles, must first study the bones; and he who would learn the blood-vessels, and nerves, (which are indeed the most important to the surgeon,) must know the muscles thoroughly. It is according to the muscles, that all the other parts are to be described; for when we trace the course of a blood-vessel, it is by pursuing its intricate wanderings among the muscles: it gives its first branch to one muscle, its second branch to another; it forks into two, under the belly of a third; it goes through the substance of a fourth muscle, or accompanies its tendon, or runs along the edge of its fleshy belly: So that in describing a great vessel, we mark its exit from the trunk of the body, its entrance into the arm-pit or groin, its

course down the arm or thigh; the dangers, the wounds, the operations of each great artery or nerve, are recorded according to the parts which their several branches supply. And besides these considerations, which cannot but have their weight, we must not forget, that the wounds of the muscles, the sprains of tendons, the rupture of ligaments, the collections under the general fasciæ or broad tendons of the limbs, are of themselves sufficient and direct motives; the only ones, indeed, that need be assigned for teaching the anatomy of the muscles with particular care.

Yet, labour it as we will, how poorly ought we to think of our own diligence, when we find Statuaries or Painters studying the anatomy of the human body, with a perseverance and success which may well put us to shame! Painters merely, who having no object so important, nor so interesting, as the injuries and accidents of the body, desire nothing more than to understand its external beauty and its form.

The Greeks lived in the most delightful countries of the world; the most beautiful people; sometimes happy, and always free. Among them the arts grew and flourished, and were to all ranks the chief business and pleasure of life:—for moderation and simplicity was in their dwellings, while all their riches were reserved for shows and festivals, for adorning their native city, for the public use. Their temples, and streets, and halls were filled with representations of a beauty, which never existed but among that happy people, or lives now only in their works, the admiration and reproach of our laggard times.

They

They saw, in their public games, the lovely forms of their youth moving in dignity and grace: For there were seen in mixed assembly;—in their women, the purest models of female beauty;—in their young men, the grandest displays of the manly form; moving and in action; inspired by every noble emulation, exulting in their strength; or advancing into the public view, only to show the beauties of their form.—Their artists needed no helps of anatomy; but in those delightful spectacles collected all the modes and forms of beauty, to combine them into one high ideal form.*

The moderns have come poorly after, in this great career; copying coldly those half-animated forms, which are seen in our schools of the arts fixed in laborious postures, “selling their ignoble beauty for a price.” Sensible of this great defect, our artists have taken the help of anatomy to correct this tame unmeaning form; studying with a noble perseverance, (but as their own critics acknowledge to us,) with but poor success. They study each muscle; they note down its direction and use; they guess at its office, and power in certain postures of the body; and try to mark it in its just place. The modern statuary, is like one wandering among the ruins of some noble city, who finding the remains of a temple, traces its lines among the ruins, and, upon this slender knowledge, tries to imagine and coldly represent to us its lost form and ancient grandeur.

* “We are taught by philosophy, the natural pre-eminence and high rank of specific ideas above individual forms.”——HARRIS.

It was thus that Michael Angelo studied our profession: and studied it so, that the lessons of that great master are a reproach to those who profess anatomical knowledge. His knowledge of anatomy gave to all his works a cast "approaching more nearly to the Etruscan stile, than to the purer taste of the Greeks;" marking them too harshly with traits of learning. His violent distortions and sudden shortenings of the limbs are less pleasing to those who delight in the delicate and higher beauty; fitting him less for representing the female form, than for giving bold and terrible pictures of action and strength. But still he is correct and true in all that belongs to the anatomy of the human body; and his studies are a trial of the anatomist's skill;—for in looking upon one of these, we find that the knee, the ancle, the neck, the wrist, each head and projecting point of bone, is truly marked; while the distortion of the figure, the violent action of the limbs, the shortenings and bendings of the joints, and the intricacy of the whole posture are difficult in the extreme; but still each limb is true, and every individual muscle swelling in its just degree, so as to preserve correctly the proportions and balance of the whole. Should not we be ashamed to compare our languid endeavours with the perfect knowledge of this great painter, the very notes of whose deeper studies in anatomy we are unable to read?

But in our profession, though the very science might almost be defined a knowledge of parts, industry and knowledge are but of low repute, and the very name of diligence and mere labour, a term of reproach; while
genius

genius is in truth nothing but a strong desire of knowledge, and the spirit of industry its truest mark. Let not the student of anatomy despise labour, nor hope to acquire his knowledge by other means. In justice to his own genius, he must take all advantage of descriptions, and drawings, and dissections, and plans; feeling, no doubt, in his first difficulties the need of every help, but striving to mount, by slow degrees, from such elementary books, as that which I now present him with, to those noble and splendid works, which were the beginning of correct anatomy, and will not be forgotten, while that branch of knowledge is respected or known. And here may I not complain, that, in scheming these plates, I am curbed and bound in by the economy of my plan? If, indeed, by wishing merely, the thing could be accomplished, this word economy should never more be heard of in all that relates to science; but many are to study our profession who cannot command those noble works; and every young man who is to study an art in which the interests of society are so immediate and so strong, should have the means of instruction put within his reach. If there be any teacher, then, who being circumscribed in point of time, would consent to offer his help and instructions in that form in which he could give them, regarding more his duty than his good name, to him this motive shall be my apology; it shall be my apology to all those who can feel with me a sincere desire to do good and to be useful;—but not to all!—for students have been already warned, that they must be jealous of those who pretend to give them plates; “that some are capable of making plates for
“them, and some are not; that those who are best able to give them plates,
“either

“either will not undertake the labour, or cannot find time.” And so, the half only of this delicate argument was left unpronounced, which was already but too plain. Now, although some unfortunate publisher of Anatomical drawings was thus left impaled upon the horn of this broken dilemma, any implied reproach could not be aimed at me particularly, since my book was not published; it was only advertised. This is perhaps a sort of caution, which it might in certain circumstances be very right, or very dutiful, or very convenient, perhaps, to give; as young men, no doubt, need some careful person to instruct and help their judgments, especially in such tender points as this. But should it ever happen, that a man of high rank and character should be found, striving to hurt any poor endeavours of mine, I might feel that rising within me, which it were almost a meanness to suppress;* and reply to him in the words of Lord Shaftsbury: “You, Sir, have a character, which sets you above us far, and releases you from those decorums, and constraining measures of behaviour, to which we of an inferior sort are bound; you may liberally deal out your compliments and salutations in what language you think fit; for I shall but strive with myself to suppress whatever vanity might naturally arise in me for such a favour bestowed; for, whatever may in the bottom be intended by such treatment, it is impossible for me to term it other than a

* Ille sapit, qui te sic utitur, omnia ferre

Si potes ac debes.

JUVENAL.

“favour

“favour, since there are certain enmities which it will ever be esteemed an honour to have deserved.”*

The author surely will not be accused of such want of taste, and relish for elegant drawing or engraving, as to hold these plates out as excelling in what is beautiful; yet, may he not hope, that they are not wanting in what is useful? They want that size which gives splendour to a grander

* Perhaps it was some such critic as this that contrived that great anatomical drawing, which either I should not have mentioned at all, or should have given some short account of.—Indeed it is not easy to deliver a fair history of even the most trivial improvement, and very seldom are we able to discover by what happy chance an idea first sprang up in the mind of its author; but perhaps the history of this grand figure might go in the following terms. The ingenious Mr. Cruikshanks, with the design of explaining all that he or Dr. Hunter had injected, of the lymphatic system, in one consistent view, took a delicate and elegant drawing of the human body, and laid his lymphatics upon it, explaining at the same time his intention, and making his apologies for this little plan; but he could not foresee that the idea thus first suggested was to receive, in passing through a greater mind, a grander form.—The expedient was tried again, and the second anatomist resolving to outdo at one stroke all his rivals, and knowing of no surer way than this, had an engraving made of a most gigantic size! An Askapart! A figure of full six feet in height; which (bating the clumsiness of conception) has turned out to be a drawing of such singular beauty, that it will not be rivalled; and as there can be no representation of the human body of more than six feet high, it positively cannot be excelled.—All those who understand the intention and effect of engraving, or who have any idea of the bold and free manner which class drawings require, must wonder even at the report of such a thing; but not as our poet Young wonders, “for wonder is involuntary praise;” if the emotion be involuntary, it will most likely be of another kind.

work,

work, and of course that proportion, which gives the full idea of the human body; they want that elegant drawing, and careful engraving, which should do any idea justice, which is so necessary in delivering the minuter parts with character and truth; all is wanting that belongs to the idea of a grander work; an idea, which the author could not but feel, yet durst not indulge. But still he hopes they may be found simple, intelligible, and plain; having whatever belongs to a little system of plates, intended merely to accompany a book of anatomy, and chiefly designed for those who are entering on their studies, and but little advanced; and he trusts that he will be indulged, in trying fairly, whether by attending to the correspondence of ideas and representations, whether by ordering his drawings so as to suit his book, whether by a careful combination of descriptions, drawings, and plans, he shall not be able to deliver a system of anatomy, intelligible, or perhaps easy for his pupils; enabling them to enter the dissecting room with confidence, and to leave it, not without instruction; and qualifying them also for understanding those illustrations, which he shall continue to give, or the corrections and remarks of other teachers:—for that student has but a mean idea of the value of his profession, who does not seek all means of instruction; and the teacher must have a poor conceit of his present knowledge, who does not hope, by his own diligence, to correct himself; or to receive lessons from others, sometimes friendly, too often in this world tinctured with its enmities and passion; such as are not pleasant in receiving, which still it is a duty to receive.

WHILE

WHILE I have ventured to speak so fully concerning the general design of these plates, it is very natural for me to say also a few words concerning the mechanical labour.

I have drawn my plates with my own hand. I have engraved some of these plates, and etched almost the whole of them: Which I mention only to show, that they have their chance of being correct in the anatomy, and that whatever, by my interference, they may have lost in elegance, they have gained, I hope, in truth and accuracy.—And while I mention this, I must not be ungrateful to Mr. Beugo, whose skill will, I hope, be shown on some higher occasion, and whose character must not be hurt by any thing that may be seen here; for wherever in these plates all is fair and clean, it is owing to his care; and those blots of execution which are not fairly covered, have not come through his correcting hand.—Whatever he has done alone has been hurried, allowing no time for artful or laborious engraving, though still all that is here, I hope, is correct and true.

I have endeavoured, also, to keep the explanation of these plates to the most simple and natural form; knowing, by long experience, that anatomical descriptions are, even to the most earnest and diligent student, very tedious and hard to be understood. The loading of such a study as Anatomy with peculiar or affected language, and with needless terms of art,

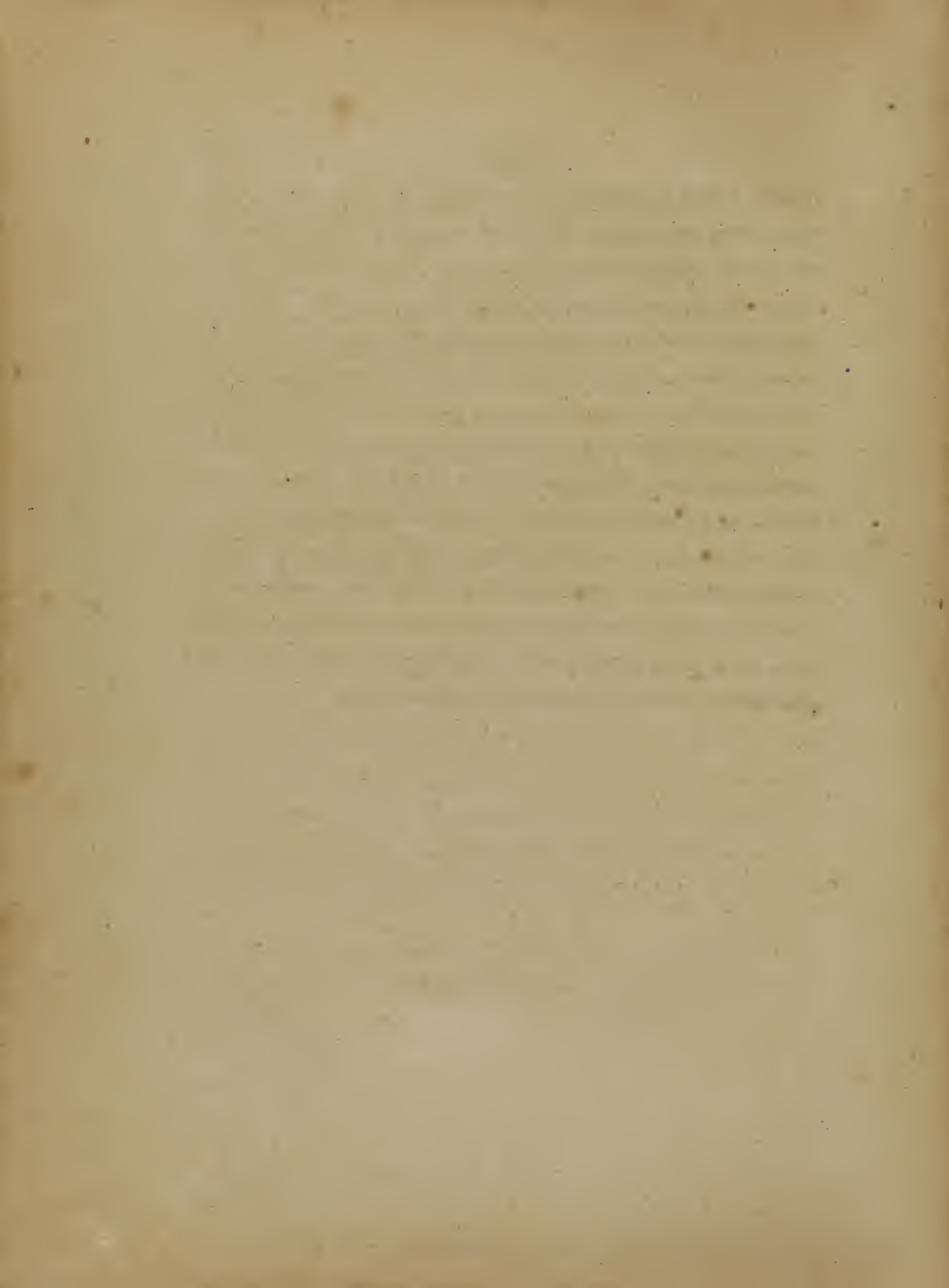
where too many are really needful, has a tawdry and vulgar appearance, of which we have much reason to be ashamed; it is a barbarous jargon, to which our ear is subdued only by long and inveterate custom: and our continual use of this trashy language in school books, presents to the student the difficult and harassing task of learning at once a new science and a strange language.

SWIFT, who commends simplicity of language, and enforces his lesson by the most beautiful examples, says, "When the water is clear you will easily see to the bottom;" but anatomists have stirred up their technical terms so thick, that the student has but a poor chance of seeing to the bottom, unless we shall agree in letting this sediment quietly subside again.

The medical student is, indeed, so accustomed to hard words, that he can scarcely think any book accurate or complete that is without them; and however well he may understand its descriptions, cannot believe them true. He is not only accustomed to know the most difficult parts by the hardest names, but to have the detail given to him in such expletives, as the Posterior, Anterior, Superior, Inferior;* and often after all, this Superior

* Our science in this country has got this vile farrago, of Anterior, Superior, &c. through bad translations of Latin and French, where such words as *Superieure* or *Superior* are in their place.

Anterior portion is but one extremity forsooth, or one portion of a part, which having other posterior extremities, or anterior portions, has to pass still through a long declension of these curious terms, which have not, like the terms in any other science, the property of conveying more regular and clear ideas, nor of saving superfluous words. They stand in place of the simple expression of upper or lower ends.—Now this clutter of hard names confounds the ear, as well as puzzles the judgment of the student, and is truly a disgrace to the science;—it looks as if we believed Anatomy to consist in strange terms, and that we could not write in true character of Anatomists, but by departing as widely as possible from the language of gentlemen. I have ventured, instead of “setting up this rank and file of tall opaque “ words betwixt the reader’s imagination and my own conceptions,” to make every description as simple as may be,—using no hard words, but the pure names; choosing rather that my book should be plainly understood, than admired as a piece of unintelligible profound anatomy.

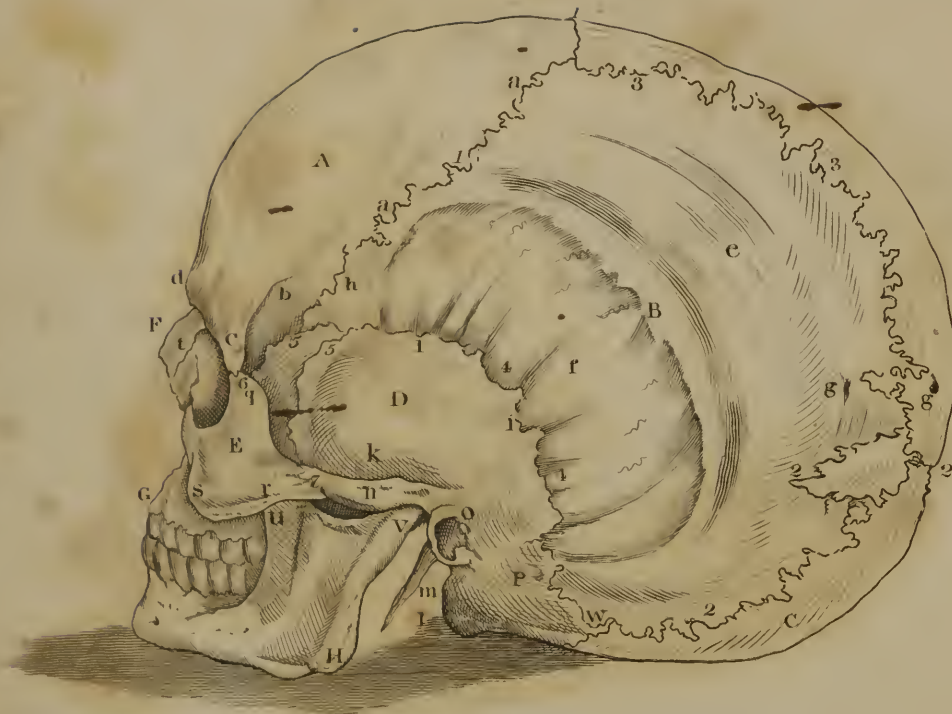


FIRST BOOK.



OF THE BONES.

I



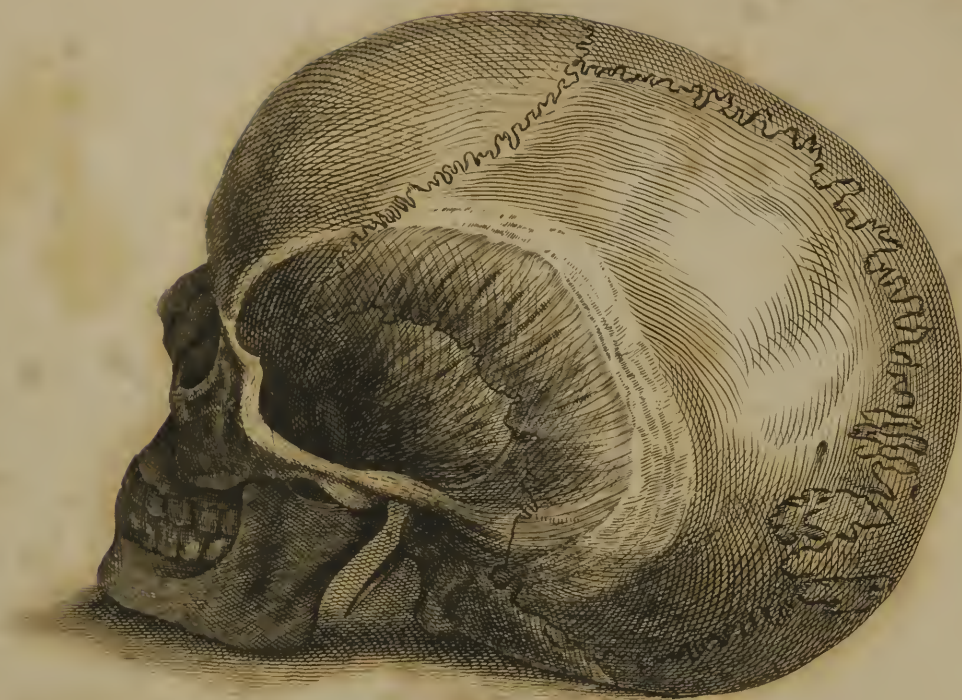
II



J. Bell del.

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I



II



BOOK FIRST.

OF THE BONES.

PLATE I.

This Plate explains the Text Book, from page 35, to page 52.

IN this Plate are represented the Adult and Fœtal Skulls, that they may be fairly compared with each other;—and there is explained here, not the minute anatomy of the individual parts, but the general view only, viz. the Bones of which the Cranium is composed;—the Sutures by which the several bones are joined. And, in the Fœtal Skull, the form and process of Ossification; and the interstices called Fontanelles, which are always left membranous, during the slow ossification of the child's head.

FIGURE I.

FIGURE I.

THE ADULT SKULL.

A The **FRONTAL BONE**, where (*a*) shows the serrated edge which forms the Coronal Suture;—(*b*) the flatter part behind the Eye, which is plain and hollow for lodging the Temporal Muscle;—(*c*) is the acute angle of the bone, which is called the External Angular Process, from its forming the outer angle or corner of the eye;—and (*d*) is that prominence over the Nose, under which there is a small cavity within the bone, called the Frontal Sinus, which the surgeon avoids in performing the operation of trepan; though it is rather from the difficulty of perforating this part that he shuns it, than from any danger in the perforation.

B The **PARIETAL BONE**. The letter **B** points to that great line, which running according to the length of the bone, with a rainbow-like arch, divides the surface into two equal parts, of which the upper and smooth-part (*e*) is covered with the thin expanded tendon of the **OCCIPITO-FRONTALIS MUSCLE**, while the lower part (*f*) has its surface radiated; and these radii are the impressions of the particular bundles of which the Temporal Muscle consists; so that “the white “semicircular line (**B**) represents the origin of the temporal muscle; and the converging lines on the surface (*f*) express the manner in which the fibres of “the muscle are gathered into a smaller compass to pass under the jugum.” *Vid. P. 61.*—(*g*) points to a small hole in the back part of this bone, which is sometimes large, sometimes wanting; and which gives passage to a small vein of the integuments, (going inwards to the longitudinal sinus or great vein of the head) and also to a small artery, which accompanies the vein: (*h*) marks that corner which, running down sharper and longer into the temple, is often called

called the Spinous Process of the Parietal Bone; and this corner is the more to be observed, that it is under it that the great artery of the Dura Mater runs.

C The OCCIPITAL BONE, of which but a very small part is seen in this direction.

D Is the TEMPORAL BONE, seen full and direct from one side; where (*i*) marks that thin upper edge, which forms the squamous suture; (*k*) the deep and flat part of the bone, on which the temporal muscle lies; (*l*) the Mastoid or Mamillary Process, named from its resemblance to a nipple; (*m*) the Styloid Process, which stands out over the back part of the throat to give origin to several muscles of the throat and tongue; (*n*) is the Zygomatic Process, which, joining with a similar process of the cheek bone, forms the zygoma or arch; (*o*) marks the Ring of the Meatus Auditorius Externus, or outward ring of the ear; and (*p*) shows a small hole, which, like that of the parietal bone, transmits a vein passing from without into the great sinus or vein within the skull, and which belongs sometimes to the temporal, sometimes to the occipital bone, or sometimes is in the suture betwixt them.

E The Os MALÆ, or bone of the cheek, which forms the lower and fore part of the socket for the eye, and supports the cheek; and by its prominence or flatness gives the form of the face;—one process (*q*) is seen here going up to meet the angular process of the frontal bone, and so is named the Angular Process of the Cheek Bone; while (*r*) another process, called the Zygomatic Process of the Cheek Bone, goes to meet the zygomatic process of the temporal bone, forming the complete jugum, or yoke, under which the temporal muscle passes; and from that prominent part of the cheek bone, which is marked (*s*), there go two remarkable muscles, one the Masseter or Grinding Muscle, which passes from

this part of the cheek bone into the angle of the lower jaw to pull it upwards: while another, a very slender and delicate muscle, goes from the same point inwards towards the angle of the mouth, and is called *Zygomaticus*, or *Distortor Oris*.

F points to the small bones of the Nose, named *NASAL BONES*; for there are two of them forming the root of the nose, and the left one is seen here; the small letter (*t*) points to what is called the *Lateral Nasal Suture*, which unites it to the upright process of the upper jaw bone.

G Points to the *UPPER JAW BONE*, of which scarcely any thing is seen in this view, except the circle called the *Alveolar or Socket Process*, in which the teeth are set.

H Marks the *LOWER JAW BONE*; and the letter is placed upon that point of the Bone which is called the *Angle*, into which the *Masseter Muscle* is fixed;—(*u*) marks that process of the jaw which is called *Coronoid or Horn-like*, which goes up under the *Zygoma* to receive the great temporal muscle as it passes under the arch;—and (*v*) is the *Condylloid Process*, or that branch of the lower jaw bone, which is crowned with the *Condyle* or head, forming the joint or hinge upon which the jaw moves; which head of the jaw bone is felt by putting the finger before the flap of the ear.

THE SUTURES ARE,

1. The *CORONAL SUTURE*, running across the head, joining the frontal to the parietal bones, extending from ear to ear; and going down into the Temple, where it joins the *Squamous Suture*, and, like it, is scaled, (*i. e.*) wants the indentations of a regular suture.

2. The

2. The LAMBDODIAL SUTURE, joining the occipital to the parietal bones; striding over the occiput, resembling the Greek letter Δ .—But the resemblance is a little hurt by the accident of an Os Wormianum, or irregular bone, such as is found more frequently in this suture than in any other; sometimes single, as in the skull from which this was drawn; but sometimes in great numbers, and not unfrequently of the size of a crown piece; these Ossa Wormiana may displace the Lambdoidal Suture so, that being out of the usual direction, it may be mistaken for a fracture.
3. The SAGITTAL SUTURE, joining the parietal bones to each other; extending from the Lambdoidal to the Coronal Suture, as an arrow lies betwixt the string and the bow.
4. The TEMPORAL or SQUAMOUS SUTURE, belonging chiefly to the temporal bone; and called squamous or scaled, because the edges of the temporal and parietal bones are there extremely thin, and are laid over each other like the scales of armour. One part marked (*w*) lying betwixt the occipital and parietal bones, is named the Additamentum Suture Squamosæ, or Supplement of the Squamous Suture.
5. Marks a part of the SPHÆNOIDAL SUTURE, joining the wing of the Sphænoid Bone, to the temporal, frontal, and parietal bones, for, in this hollow under the zygoma, all these bones meet by thin scaled edges, and lap over each other; so that all the sutures in the Temple are squamous.
6. The TRANSVERSE SUTURE, is one which runs across the face, through the middle of the orbits, and over the root of the nose, and the end of it appears here, joining the angular processes of the frontal bone, and of the cheek bone.
7. The ZYGOMATIC SUTURE.

FIGURE II.

THE FŒTAL SKULL.

EXPLAINS the FŒTAL SKULL;—where we find the holes, processes, and other marks, very imperfect: Of course a shorter and more simple explanation will serve.

A Is the FRONTAL BONE; and the letter is so placed, as to mark the central point, where the ossification begins; the ossification being more perfect at this point, and going in a radiated form towards all the edges of the bone, leaves the ossification very imperfect all round the edge of the bone; and at (*d*) there is a difference betwixt this and the Adult Skull, for here the cavity of the Frontal Sinus is not yet formed.

B The PARIETAL BONE; where also the letter marks the centre of ossification; the radii are very plain; and the edges are seen imperfect and membranous, leaving all the sutures imperfect. The ridge, which divides the bone, is not yet formed; for the Temporal Muscle has not yet begun to mark the bone.

C The OCCIPITAL BONE; where the letter again in this bone, points to an ossifying central point.

D The TEMPORAL BONE; where many parts, marked in the Adult Skull, as the Styloid and Mastoid processes,—the small hole,—and the marks of the Temporal Muscle, are all wanting. And the ring (*o*) of the Meatus Auditorius Externus,
is

is merely a ring; is fixed to the bone only, and not joined with it; and is here seen covered with the smooth membrane of the Tympanum, or Drum of the Ear.

E The CHEEK BONE; which, like all the other bones, is very round, and its edges blunt and ill defined.

F The SMALL BONES of the Nose.

G The UPPER JAW BONE; where, since the teeth are not yet come up, the Alveolar or Socket Process is not formed, nor even marked.

H The LOWER JAW BONE; where also the Alveolar Process is wanting, and where the branch of the jaw bone does not rise from the basis, or lower line, with a bold and acute angle, but goes obliquely off, more horizontal, and more in the same direction with the rest of the bone.

And lastly, the chief point to be observed, in the skull of a child, is the openings of the head; for the parietal bone is so incomplete round all its edges, that it leaves all the sutures imperfect and membranous, and leaves some openings particularly large. (*aaaa*) mark the four corners of the greater opening upon the top of the head; which, from the hypothesis of its serving as a drain, is called the Fontanelle, or Fountain of Moisture. It has four angles, is formed by four crossing sutures; the Sagittal Suture, descending quite to the nose. The Fontanelle is covered only with a thin and delicate membrane; it is named the Greater Anterior, or True Fontanelle, the opening of the head.

(*b*) Marks

(b) Marks a lesser opening, which is formed by the meeting of the Lambdoidal and Sagittal Sutures; but, as they do not cross, there are here but three converging lines; three angles or points of bone; no perceptible opening, but the bones rather lapping over each other. It is over this point that the hair turns in a sort of vortex, if we may be allowed to explain it so; and though the greater Fontanelle was thought to present in labour, this back Fontanelle is the true presenting point.

(c) Marks a small Fontanelle, or membranous interstice before the ear; and

(d) Marks another small Fontanelle behind the ear, in the place of the Additamentum Suturae Squamosæ; and it is the more to be remarked, as it is through this little Fontanelle, that the accoucheur opens the head in the rare coincidence of preternatural posture of the child, and deformed Pelvis; where after delivering the body, it is impossible to get the head out: and he prefers this opening, and shuns the back Fontanelle, lest, in piercing there, he should cut the ligament of the neck, and so lose his hold of the head.



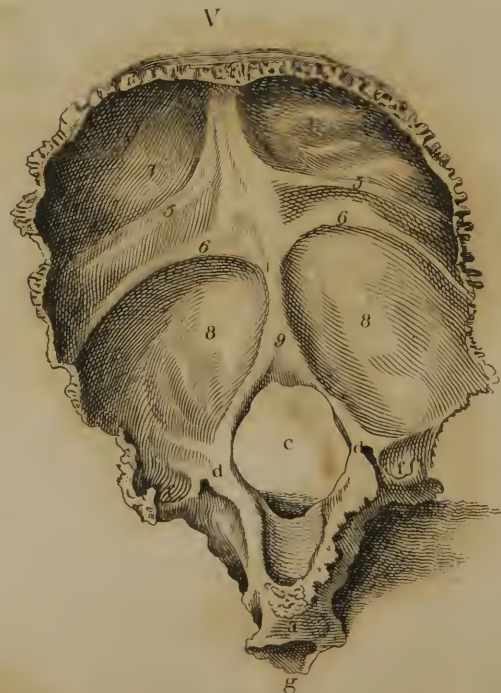
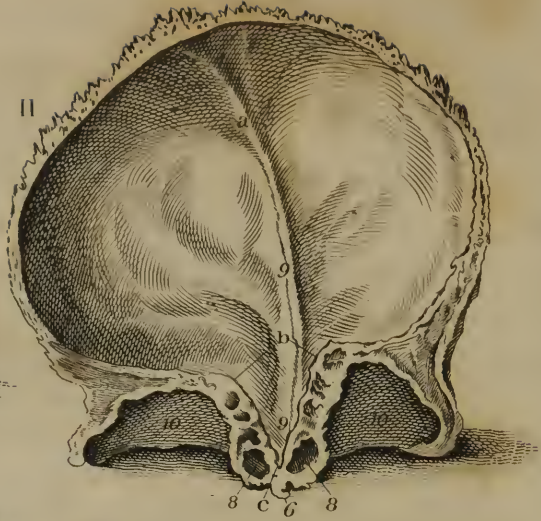


PLATE II.

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*This Plate explains the Text Book, from page 52, to page 65.*  
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EXPLAINS the individual bones of the **CRANIUM**, the **FRONTAL**, **PARIETAL**, and **OCCIPITAL BONES**.

 FIGURES I. AND II.

EXPLAIN the **Os FRONTIS**, or bone of the forehead. The numbers apply equally to either figure; and every number wanting in the first figure, must be sought for in the second.

1. The **SUPERCILIARY RIDGES**, on which the eye brows are placed, and which form the frontal sinuses. The skin is very firmly attached to the bone, all along this ridge; and the Frontal Muscles arise here. The many small dots, which are seen all along this ridge, are the marks of many little arteries, entering here to nourish the bone.
2. Points to that hole which is called the **SUPERCILIARY HOLE**, for it permits the small Superciliary Artery and Nerve to come out from the socket of the eye to
 turn

turn upwards upon the forehead, where they take the names of Frontal Artery and Nerve. On the one side it is a fair round hole, on the other side it is a notch only.

3. The two INTERNAL ANGULAR PROCESSES.

4. The two EXTERNAL ANGULAR PROCESSES.

5. The Hollow behind the External Angular Process, in which the Temporal Muscle lies.

6. The NASAL PROCESS; standing up sharp and rough, betwixt the two internal angular processes.

7. The BUMP, at the inner end of the Superciliary Ridge, marking the place of the Frontal Sinus, and indicating also the size of that cavity, by the degree of rising.

8. The MOUTH of the FRONTAL SINUS; where it opens into the Nose.

9. —is to be found on Figure II. only, and marks the SPINE, or Ridge to which the falx, or perpendicular partition of the Dura Mater is fixed; and (a) shows the groove, in which the ridge very generally terminates.

10. The two ORBITARY PLATES; which are those two thin parts of the bone, which extend over the eye, so as to form the roof for the eye, and the floor for the fore lobes of the brain; and it is by the continual pressure betwixt these two parts, that the Orbital Processes become so extremely thin, that they are quite transparent.

(b) Marks

(b) Marks the space or distance betwixt the two ORBITARY PROCESSES; which space is occupied by the Œthmoid Bone, which thus lies over the root of the Nose.

11. The mark of the Cartilaginous pully, through which the tendon of the Obliquus Oculi runs; and

12. Is the Superficial hollow for lodging the Lachrymal Gland in the upper part of the Orbit.

(c) Upon Figure II. shows the blind hole where the falx begins. This blind hole sometimes belongs to the Frontal Bone, sometimes to the Œthmoidal Bone, but lies most commonly in the middle, betwixt the Œthmoid and Frontal Bones.

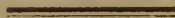


FIGURE III.

SHOWS the two OSSA PARIETALIA, or Parietal Bones, separated from the other bones of the Cranium, and also parted a little from each other, so as to show that serrated edge, which forms the Sagittal Sutures.

1. Shows the serrated edges, forming the SAGITTAL SUTURE,
2. The edge of both bones, which, in a semicircular form, produce by their union with the Frontal Bone, the CORONAL SUTURE.

PART I.

F

3. The

3. The thin semicircular edges, to which the Temporal bones are joined, forming the Temporal or SQUAMOUS SUTURE.
 4. The SPINOUS PROCESS; or largest and most pointed corner of the Parietal Bone.
 5. The RADIATED SURFACE, upon which the great Temporal Muscle lies; (*a*) marking that ridge of the bone, which divides it into two parts, and beyond which the origin of the Temporal Muscle does not extend.
 6. The place where the Artery of the Dura Mater first makes its impression, *viz.* at that sharp corner of the bone, which shoots down into the temple.
- N. B.* The only hole, which belongs to the Parietal Bone, cannot be seen in this view, but is to be found in the first plate.

FIGURES IV. AND V.

EXPLAIN the Os OCCIPITIS. It is here shown in two opposite points of view, from within, and from without; the letters and figures apply to either figure; and the fourth figure naturally takes the lead, as the description of the Occipital Bone always begins with the external surface.

FIGURE IV. The outer surface.

1. The

1. The UPPER TRANSVERSE SPINE, formed for the implantation of the Trapezius and Complexus; or produced, according to some, by the action of these great muscles.
2. The SMALLER and LOWER SPINE, formed by the Recti Muscles;—small muscles which come up from the first Vertebra to lay hold on the Occiput.
3. The PERPENDICULAR SPINE, which divides the muscles of the opposite sides from each other; and by this crossing, these two spines are named, in general terms, the Crucial Spines.
4. The GREAT TUBEROSITY, sometimes called the Spinous Process of the Occipital Bone. (*a*) The Cuneiform Process, which meets the Os Sphænoides. (*b*) The Condyle, or Joint Process, on which the head moves, at least in the nodding motion. (*c*) The Foramen Magnum, through which the spinal marrow passes out from the skull. (*d*) The Hole for the 9th, or Lingual, pair of Nerves. (*e*) The smaller Hole behind the Condyle, for the passage not of any nerve, but of a cervical vein going in towards the Great Lateral Sinus.

In FIGURE V. is explained the inner surface of the Occipital Bone; and the figures are continued, that the description may go on still in the same order.

5. Is the ridge to which the Tentorium, or membrane which supports the brain, and defends the Cerebellum, is fixed.
6. The two furrows, in which lie the Right and Left Lateral Sinuses, making this broad groove.
7. The two hollows for lodging the backmost lobes of the brain, above the place of the Tentorium or supporting membrane.

8. Two

8. Two similar hollows, for lodging the two lobes of the Cerebellum, below the place of the Tentorium or cross membrane.
 9. The mark of a small falx or process of the Dura Mater; which is like the great one, and like it contains a small sinus or vein in it, the groove of which small sinus is easily seen here.
- (a) The Cuneiform Process. (c) The Foramen Magnum. (d) The hole for the ninth pair of Nerves. (f) The hollow or thimble-like cavity, in which the end of the Lateral Sinus lies; for at this point the sinus turns suddenly round, escapes from the skull, and getting down into the neck, loses the name of Sinus, and takes that of Internal Jugular Vein.
- (g) There was left sticking to the end of this bone a fragment of the Sphænoid bone, so that at this point the Cuneiform processes of the Occipital and Sphænoid bones are so united, that to separate them (in the adult at least), we must break them; and in breaking these bones, the great cell of the Sphænoid bone, or part of it, stuck to the Cuneiform process of the Occipital bone; and this cell is marked (g).



PLATE III.

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*This Plate explains the Text Book, from page 65, to page 94.*  
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EXPLAINS much of the difficult Anatomy of the Scull; for these bones, the TEMPORAL, ÆTHMOID, SPHÆNOID, and UPPER JAW BONES, have many curious and intricate parts.

FIGURES I. AND II.

EXPLAIN the TEMPORAL BONE; and now again the letters and numbers belong in common to both Figures; to Figure I. which explains all the parts that are upon the outside of the Temporal Bone, and also to Figure II. which explains all that side of the Temporal Bone which is towards the brain.

The GREAT DIVISIONS of the Temporal Bone, are; (a) The squamous, or thinner part, forming the Squamous or Scaled Suture. (b) The Pars Petrosa, or Rock Part, which is, indeed, in the child, a distinct bone. (c) The Occipital Angle, or that corner of the bone, which is joined to the Os Occipitis, by the Additamentum Suture Squamosæ.

The

THE PROCESSES OF THE TEMPORAL BONE, ARE,

1. The ZYGOMATIC PROCESS, stretching forwards to meet that of the cheek bone.
2. The STYLOID PROCESS, standing downwards over the throat, to give origin to many of the muscles of the throat.
3. The VAGINAL PROCESS, which is a kind of rough rising at the root of the Styloid Process.
4. The MASTOID or MAMILLARY PROCESS, which is not formed in the child; which consists of cells; it is felt immediately behind the ear, belongs to that organ, and is perforated (so it is proposed at least) in certain kinds of deafness.
5. THE AUDITORY PROCESS, which is named a process, because it is in the child a distinct part, and still is in the adult (as represented here) a prominent ring.

THE HOLES of the TEMPORAL BONE relate chiefly to the EAR.

1. (*d*) Marks the MEATUS AUDITORIUS EXTERNUS, the outer Auditory hole, upon which the drum of the ear is braced down.
2. (*e*) The Internal Auditory hole, or MEATUS AUDITORIUS INTERNUS, by which the Auditory Nerve has access to the Ear.
3. (*f*) A small hole for admitting a delicate thread-like nerve, which returns from
without

without into the Cranium again, and joins the Portio Dura, or hard part of the Auditory Nerve while it is going along the passages within the Ear.

4. (*g*) The **STYLO-MASTOID HOLE**; which has its name, from its being at the root of the Styloid and Mastoid processes; it gives passage to the Portio Dura, or that small hard Nerve, which accompanying the Auditory Nerve, goes along with it into the passage of the Ear; but, while the Portio Mollis, or proper Auditory Nerve, remains within the Ear, this Portio Dura, a distinct Nerve, and destined for the face, comes out by the **STYLO-MASTOID HOLE**, under the ear, and spreads upon the cheek.
5. (*h*) Marks the ragged end of the Petrous Portion. The bony part of that canal, named the **EUSTACHIAN TUBE** ends here; but the Tube is chiefly Cartilaginous, and therefore in this the dried bone, its openings appear quite irregular and rough; and when the student looks for the Eustachian Tube, he finds nothing but confused and ragged openings. The mouth of the Eustachian Tube, as it appears when dried, is seen in its right place, *Vid. Pl. VI.*
6. (*i*) The hole for the **CAROTID ARTERY** is also to be looked for at this point, though it cannot be seen in this particular view, unless the end of the Petrous Portion were turned more directly towards the eye.
- (*k*) is the **GREAT FURROW**, which the Lateral Sinus, or great internal vein makes, forming a thimble-like cavity at (*l*), by the last sudden turn which it makes before leaving the skull.
- (*m*) Is a very small **FURROW**, formed by a small Sinus, or vein, which goes along the ridge of the Petrous Portion.

7. (*n*) Is

7. (*n*) Is the last or 7th hole of the Temporal Bone. This is the small hole, formerly mentioned for the passage of a trifling vein from without into the Lateral Sinus.

N. B. The joint or Condyle of the lower jaw is set in the hollow (*o*) just under the root of the Zygomatic Process.

FIGURES III. AND IV.

EXPLAIN the **ÆTHMOID BONE**; **FIGURE III.** showing chiefly the upper surface of the bone, which supports the fore part of the brain, and which is marked by the Crista Galli (*b*); and **FIGURE IV.** shows that confused surface, which hangs over the root or upper part of the Nose, and whose spongy bones, (*dd*) form a part of the Organ of Smell.

(*a*) The **CRIBRIFORM PLATE** is the centre, as it were, of this bone, to which all the other parts are referred; this plate is perforated by the Olfactory Nerves, and it is from this horizontal and perforated plate, that the whole bone has its name.

The parts belonging to the **Æthmoid Bone** are,

1. (*b*) Is the Perpendicular Process, which stands up from the Cribriform Plate, towards the brain; and is named **CRISTA GALLI**.
2. (*c*) Is the **NASAL PLATE**; which forms the Septum or partition of the Nose, standing perpendicularly downwards and forwards, as the Crista Galli stands upwards: the Crista Galli and the Nasal Plate, are exactly opposite to each other.

3. (*dd*) The

3. (*dd*) The two upper Spongy Bones; they are named spongy, from their constitution, for they consist of cells; they are called *Ossa Spongiosa Superiora*, to distinguish them from two similar bones, which hang in the lower part of the Nose. They are spoken of as distinct bones, while they are but parts of the *Æthmoid Bone*.
4. (*e*) The ORBITARY PLATE of the *Æthmoid Bone*; which, as it is inclosed among the other bones of the Orbit, seems to be a distinct bone surrounded by a peculiar suture, and so is named the *Os Planum*; though it is merely the flat side of the *Æthmoid Bone*.
5. (*f*) Marks the place where the *Os UNGUIS* should be seen; but it is pulled away to show the numerous cells of the *Æthmoid Bone*. These cells are divided into two sets, one set attached to the Orbital Plate, or flat square side of the *Æthmoid Bone*, the other set to the Spongy Bone.
6. (*g*) FIGURE IV. shows that set of the cells, which more particularly belongs to the Spongy Bone, and (*h*) FIGURE III. shows the cells opened from above, to give a view of those, which more particularly belong to the Orbital Plate.

Whatever farther is necessary to the demonstration of the *Æthmoid Bone*, is to be found in Plates V. and VI. where the cells are particularly well explained.

FIGURES V. AND VI.

EXPLAIN the SPHÆNOID, PTEREGOID, or WEDGE-LIKE BONE; it is named Pteregoid from its resemblance to a bat, and is so presented here, as to suggest the likeness.

PART I. G Figure

Figure V. shows the back view of the bone, *viz.* that which is turned towards the skull;—Figure VI. shows the front view, *viz.* that which is connected with the bones of the face.

ITS PROCESSES ARE,

1. The ALAE, or wings, commonly named the Temporal Processes, for they lie in the Temples; the Temporal Muscles lie upon them, and their upper edge is squamous like the edge of the Temporal bone, and forms part of the Squamous Suture.
2. Marks that smooth surface of this TEMPORAL PROCESS, which, being turned towards the eye, enters into the Orbit, and so is named the ORBITARY PROCESS of the Sphænoid Bone.
3. The small and sharp SPINOUS PROCESS.
4. The hook-like point of the Spinous Process, which is often named the Styloid Process.
5. The External PTEREGOID PROCESSES; which are two flat and broad plates.
6. The two internal PTEREGOID PROCESSES; which stand off a little higher, and more direct from the body of the bone; they are smaller; and terminate in a little hook. The Pteregoid Muscles, which go to the lower jaw, arise from the processes themselves; and the TENSOR PALATI MUSCLE turns round this little hook.
7. The AZYGOUS, or single Process; which is single, because it stands out from the middle of the bone. It forms part of the partition for the Nose, and is thence named NASAL PROCESS.
8. The

8. The two ANTERIOR CLYNOID PROCESSES.
9. The two POSTERIOR CLYNOID PROCESSES.
10. The space bounded by these four CLYNOID PROCESSES; which, from resembling a Turkish saddle, is named SELLA TURCICA.
11. The two little wings of Ingrasias, called the TRANSVERSE SPINOUS PROCESSES.

The cells, which occupy the body of this bone, lying under the SELLA TURCICA, are to be seen at (*g*) Figure VI. and again in Plate VI.

The HOLES proceed next in order, and are marked also with a suit of numbers, that the demonstration may be continued and entire.

1. (*a*) The two OPTIC HOLES, transmitting the Optic Nerves; which are the second pair of the scull; for the first pair, *viz.* the Olfactory Nerves, pass through the Æthmoid Bone.
2. (*b*) The FORAMEN LACERUM; or wide hole, which permits the third, the fourth, the first branch of the fifth, and the sixth pairs of Nerves to pass; for all these are smaller nerves, destined for the Muscles of the Eye, and enter thus at the bottom of the socket, while the second pair is the proper Optic Nerve.
3. (*c*) The FORAMEN ROTUNDUM; it transmits the second branch of the fifth pair which goes to the upper Jaw.

4. (*d*) Is

4. (*d*) Is the FORAMEN OVALE, (larger than the Foramen Rotundum) which transmits the third branch of the fifth pair, going to the lower jaw.

5. (*e*) The SPINOUS HOLE, the Foramen Spinale, which is a small hole in the very point or tip of the Spinous Process. It is not for the transmission of a nerve; but for the entrance of that small artery which belongs to the Dura Mater, and which goes along the inner surface of the Parietal Bone, marking it with its furrow. A bristle is passed through this hole in one side, to show the course of the artery.

6. The sixth Hole. The PTEREGOIDEAN, or VIDIAN HOLE, is not to be seen in this view; but is to be seen in the next Plate, IV. where it is marked with its proper number, 6.

(*f*) Represents the rough surface where the cuneiform or wedge-like part of this Sphæ-noid Bone has been broken off from the wedge-like process of the Occipital Bone.

(*g*) Marks the Cells of the Sphæ-noid Bone, which are occasionally very large, as in this Bone; and which make all the bone hollow under the Cella Turcica.

(*h*) Shows where the Palate Bone had adhered to the Sphæ-noid;—and the Palate Bone, being torn away, has broken, and left some of its small cells sticking here to the Sphæ-noid Bone.

N. B. The Cells of the Palate Bone are explained in the next plate.

This Bone is connected;—at (*i*) Figure VI. with the Œthmoid Bone before;—at (*f*) Figure V. with the Os Occipitis behind; at (1.) with the Temporal Bones in the Temples. The Spinous Process (3.) is locked in betwixt the Temporal and Occipital

Occipital Bones;—and the Pteregoid Processes (5.) are joined to the Palate Bone, and form the back of the Nostrils. *Vide* next plate, where the Pteregoid Processes are seen in their place.

FIGURES VII. AND VIII.

THE VII. and VIII. figures of this plate explain the UPPER JAW BONE; Figure VIII. showing its Internal Surface, viz. that next to the nose, with the wide opening of the Antrum, or Great Cavity of the Jaw. Figure VII. showing the outside of the Bone, explaining the outside walls of the Antrum, or Great Cavity: so that, by comparing the two sides of the bone, one can easily understand the great extent of the Antrum, or Cavity; and how pulling a tooth will open the way for matter flowing out from it.

1. The NASAL PROCESS which rises up on each side to form the sides of the nose. The Arch forms the sides of the nose; and the rough pointed ending of this Nasal Process is connected with the Os Frontis.
2. Is the ORBITARY PLATE, or that plate which forms the floor of the eye, and the roof of the Antrum, or Cavity.
3. The MALAR PROCESS, or that broad rough surface upon which the Cheek Bone rests.

4. The

4. The ALVEOLAR PROCESS, or that projecting semicircle, which holds the teeth; thence named Alveolar, or Socket Process.
5. The PALATE PLATE, or Process, of which we see the rough edge only, viz. that edge by which the Middle Palate Suture, the suture in the roof of the mouth, is formed.

N. B. The Palate Plate is seen full in Plates IV., V. and VI.

6. The ANTRUM MAXILLARE, or HIGMORIANUM. This great cavity appears with a very wide opening here in the naked bone; but this opening is covered in the entire skull, both by the lower spongy bone, and by the nasal plate of the palate bone. This nasal plate of the palate bone is left in this drawing covering a part of the Antrum; the rest of this opening is naturally covered by a membrane, which leaves but one small hole.

The Nasal Plate of the Palate Bone which is left sticking upon the Antrum is marked (*a*).

- (*b*) Marks the only Hole of the Upper Jaw Bone. It is named the Infra-Orbitary Hole. A chief nerve of the face comes out here, named (with its hole) the Infra-Orbitary Nerve.

The proper Infra-Orbitary Hole is marked (*b*); and the Canal by which the nerve comes down is marked (*c*): at this place the nerve lies under the eye, upon the floor of the orbit,—making a very large groove and hole upon this Orbitary Plate of the Upper Jaw Bone; for arteries running along bones do not make deeper grooves than the nerves do.

N. B. This

N. B. This Infra-Orbital Nerve is a chief branch of the Superior Maxillary Nerve.

(*d*) Marks the FORAMEN INCISIVUM; so named from its being just above the Incisores or cutting teeth. It is also named Anterior Palatine Hole; it is complete only when the two jaw bones are joined, as in Plate IV. Fig. III. at (*l*) which marks this anterior Palatine hole.

(*e*) Marks the course of the Lachrymal Duct, or tube which conveys the tears, which, after having passed through the Os Unguis, makes this groove in the Nasal Process of the upper jaw bone, and ends or opens into the Nose just where this duct ends.

PLATE



PLATE IV.

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*This Plate explains the Text Book, from page 85, to page 104.*  
 ~~~~~

EXPLAINS the BONES of the FACE, and the LOWER JAW BONE.

FIGURE I.

REPRESENTS the two NASAL BONES, laid to each other in their natural direction;
 by which is explained,

1. The NASAL SUTURE; joining these two Nasal Bones to each other.
2. The SERRATED SURFACE, by which they are joined with the Os Frontis, at the roughness round the root of the Nasal Process; which union forms part of the Transverse Suture.
3. The ROUGH SURFACE, by which they are joined to the two cartilages that form the Alæ Nasi, or Wings of the Nose.
4. The ROUGH SURFACE, by which they are fixed to the Nasal Processes of the upper jaw bone.

FIGURE II.

EXPLAINS the Os UNGUIS, where both the drawings show that surface which appears in the orbit; and in both of them is seen,

PART I.

H

1. The

1. The plain surface upon which the eye rolls; and
2. The Groove which holds the Nasal Duct.

FIGURE III.

EXPLAINS, by a useful drawing, many very important parts on the basis of the scull. (*a*) the Foramen Magnum: (*b*) the Condyle: (*c*) the two Pteregoid Processes; (*d*) the Hook of the Inner Pteregoid Process, showing how the Tendon of the Circumflex Muscle may twist round it: (*e*) the Styloid Process: (*f*) the Mamillary Process: (*g*) that part of the Palate, or roof the mouth, which is formed by the upper jaw bones: (*h*) the smaller part of the Palate, formed by the proper palate bones; (*i*) the Middle Palate Suture: (*k*) the Transverse Palate Suture: (*l*) the Anterior Palatine Hole, or Foramen Incisivum: (*m*) the two Posterior Palatine Holes, transmitting the nerves for the palate: (*n*) the Vomer, or bone forming the septum or partition which divides the two nostrils: (*o*) the two Upper Spongy Bones, *viz.* those belonging to the Æthmoid Bone, hanging in their places high in the nostrils: (*p*) the two Lower Spongy Bones, which are independent bones hung by a hook upon the side of the Antrum Highmorianum, and consequently hanging very low in the nostril.

FIGURES IV., V. AND VI.

EXPLAIN the PALATE BONES; where Figures IV. and V. show the two Palate Bones separated from each other, and from the other bones. Figure VI. shows the two Palate Bones joined. On these drawings, the same figures still mark the same points,—the numbers marking Processes, and the letters running under them marking as usual the lesser parts.

1. Shows

1. Shows the PALATE PLATE, or Process of the Palate Bones; and in FIGURE VI. the palate plates are joined, so as to form the back part of the middle palate suture: (*q*) is the broad rough surface by which the two palate bones are opposed to each other, and which forms the Middle Palate Suture: (*r*) is the middle point, from which the Uvula, Pap, or Gurgulion hangs down.
2. Is the PTEREGOID PROCESS of the palate bones, having a little hollow into which the Pteregoid Processes of the Sphænoid Bone are received.
3. Is the NASAL PLATES, which lie within the nostrils; and which, by lying flat upon the sides of the Antrum Highmorianum, close it in part.
4. Is the ORBITARY PROCESSES; for the Nasal Process lies up along all the side of the nostril, and ends in a broader knob, which enters into the socket of the eye at its deepest part, and is there named Orbital Process.
5. Marks the Cell or Cells of the Palate Bone, which are in its Orbital Process, and which are joined to those of the Sphænoid bone.

FIGURES VII. AND VIII.

THE two SPONGY BONES.

FIGURE VII. Explains the rolled and spongy appearance of the spongy bone. It represents that surface which is turned outwards, *i. e.* towards the septum of the nose.

FIGURE VIII. shows that flatter side which is turned towards the Antrum Highmorianum, and closes it; and the letter (*s*) marks the small point, or hook-like process, by which this lower spongy bone is hung upon the edge of the opening into the Antrum Highmorianum. (*t*) is the fore end of the spongy bone, which is turned forwards in the nose, covering the lower end of the nasal duct; so that in seeking to clear the duct with a probe, we must pass it under this point. (*u*) is the other end of the spongy bone, which is turned backwards in the nostrils.

The

The position of the spongy bone in the nostrils is well explained in Figure III. and the fore part of the same spongy bone is seen in Plate VI. Figure II.

FIGURE IX.

REPRESENTS the VOMER.

1. The GROOVE, in its upper part, by which it sits astride upon the Azygous Processes of the Æthmoid and Sphœnoid Bones.
2. Its Lower Groove by which it sits down upon the rising point of the Maxillary and palate bones: and (*r*) Figure VI. shows how it stands upon the palate bones. The letter (*v*) Figure VI. shows the Great Groove turned upwards to be fixed to the Azygous Processes of the Æthmoid and Sphœnoid bones, and the letter (*n*) Figure III. shows the Vomer in its right place in the nose, dividing the nostrils.
3. The Ragged Grooved Surface, which looks forwards and receives the plate of cartilage, which completes the partition betwixt the nostrils.

FIGURE X.

REPRESENTS the CHEEK BONE.

1. Shows the Upper Orbital Process.
2. Marks the Inferior or Lower Orbital Process.
3. The Maxillary Process.
4. The Zygomatic Process; and
5. Marks the plate which forms the lower and fore part of the socket for the eye, and so is named the Internal Orbital Process.

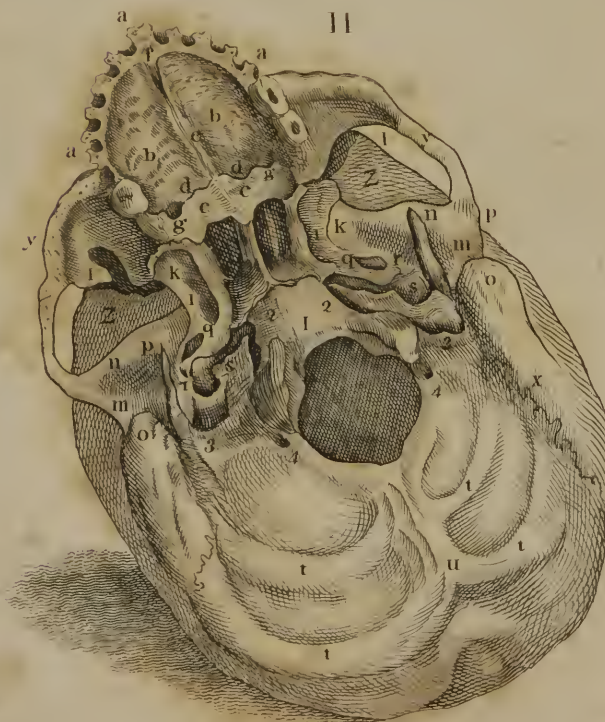
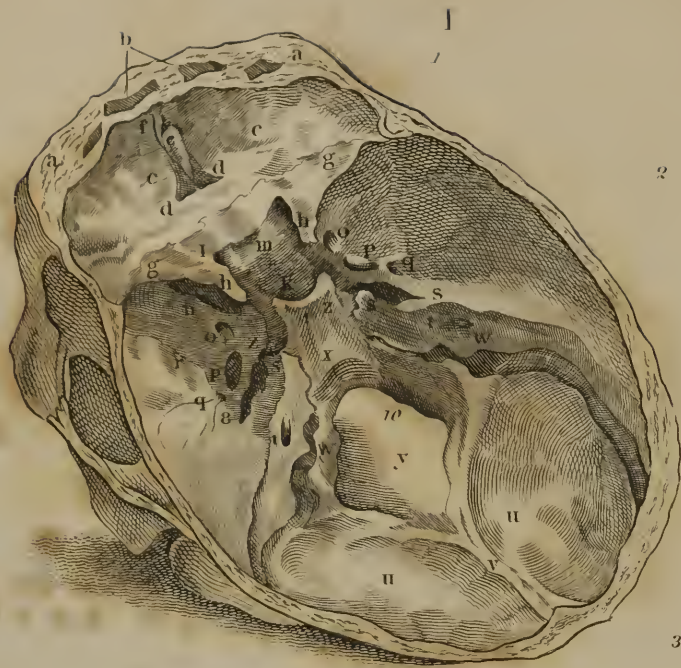
FIGURES

FIGURES XI. AND XII.

EXPLAIN the lower jaw bone, in two views; but every Figure applies to each bone, and the Figures proceed in the order of the Text Book.

1. The **CHIN**; the lines comprehend the Chin in their course, and they terminate so as to mark the small **Mental Holes** on both sides of the Chin, where the nerves, after having furnished the teeth, come out upon the face.
2. Marks the line of the **Base of the Jaw**, extending from the Chin to the **Angle**.
3. Marks the **Angle of the Jaw**, which is irregular and knotty, by the insertion of the great **Masseter Muscle**.
4. The **Coronoid Processes** of the jaw.
5. The **Condoloid or Articulating Processes**; (*y*) the great hole which receives the lower **Maxillary Nerve**. We see here likewise the deep and wide groove that leads to the nerve; and another deep, but smaller groove, which shows where the nerve which belongs to the tongue, departs from the great nerve, and runs along the inner side of the jaw bone betwixt it and the tongue.
6. Is the **ALVEOLAR or SOCKET PROCESS**, with the teeth in it.

PLATE





I



II



PLATE V.

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*This Plate explains the Text Book, in all the Chapters upon the Skull.*  
 ~~~~~

IS a general view of the CRANIUM,——explaining and connecting the demonstrations of the individual parts.

FIGURE I.

IN this view, where the Cranium or Skull Cap is cut off, and the basis seen from within, the thing that first strikes the eye is,—the formal and regular division of the Cranium into three hollows (1. 2. 3.); and each of these is like a stage or deck, one lower than the other.

- (1.) Is the fore part of the basis of the Skull, the shallowest and most superficial hollow. It is formed chiefly by the Frontal, Œthmoidal and Sphænoidal Bones. It is marked with undulating lines, corresponding with the intestine-like convolutions of the brain.—This division supports the Fore Lobes of the brain, and gives passage to the Olfactory and Optic Nerves.
- (2.) Is a large hollow, cup-like, deeper than the first;—lying under the temple;—formed chiefly by the wings of the Temporal and Sphænoidal, and by the corners of the Frontal and Parietal Bones. This holds the Middle Lobes of the brain, contains the Petrous part of the Temporal Bone;—gives out all the smaller Nerves belonging

longing to the Eye, and all the great nerves belonging to the Upper and Lower Jaws; it gives also the Auditory Nerves, which enter here into the Petrous Portion of the Temporal Bone.

- (3.) Is a stage lower still, being the deepest hollow of the three; is formed chiefly by the cup of the Occipital Bone, and by a small part of the Temporal Bones;—and as the Cerebellum supports the back lobes of the brain, this hollow may represent the back lobes, or the third division of the brain;—so this last hollow contains the Cerebellum; gives out the Lingual Nerves, which pass through a hole of the Os Occipitis; and sends out the Spinal Marrow through the Foramen Magnum, or Great Hole.

FIRST DIVISION.

In the first division are seen the parts and holes of the **FRONTAL**, **ÆTHMOIDAL**, and **SPHÆNOIDAL BONES**.

FRONTAL BONE.

- (a) Marks the Cancelli, or Diploe of the Frontal Bone so cut as to make the Cancelli appear very wide; but that proceeds from having cut the skull very low, which has taken off the outer layer of the Orbital Process. (b) Marks the regular or proper Frontal Sinuses, which are thus understood to be like enlarged cells of the Diploe; while (c) shows a part of the cells going down into the Orbital Plates: for the sinuses sometimes extend thus all over the eye, as in this skull; and the letter (c), while it points to this extension of the Frontal Sinus, is so placed as to mark the undulating forms, which the lobes of the brain give to this thin Orbital plate of the Frontal Bone.

ÆTHMOIDAL

ÆTHMOIDAL BONE.

There is incased betwixt (*c c*) the Orbital Plates of the Frontal Bone, the Cribriform plate of the Æthmoidal Bone;—where (*d*) marks the Cribriform Plate with its numerous small holes for transmitting the Olfactory Nerves. (*e*) Marks the Crista Galli, whence the falx begins. (*f*) Points to that hole which is called the Blind Hole, which is as small as a pin's point, and which belongs in common to the Æthmoidal and Frontal Bones.

N. B. The small crack to which the lines running downwards from (*d*) point, and which indicates the Suture surrounding the Æthmoidal Bone and named Æthmoidal Suture, can hardly be mistaken.

SPHÆNOIDAL BONE.

The Sphænoid Bone is known here by its two processes named TRANSVERSE SPINOUS, or LITTLE WINGS of INGRASIAS marked (*g*); the lines from the letter (*g*) point to the Sphænoidal Suture, which separates this Bone from the Frontal and Æthmoid Bones. (*h h*) Mark the two Anterior Clinoid Processes. (*i*) Marks the Posterior Clinoid Process; for it is rather one Process terminating in two little horns or knobs. (*k*) Is set down in the Sella Turcica in the very centre of the Clinoid Processes where the Pituitary Gland is lodged. (*l l*) Mark the two Optic Holes, which are scarcely seen, for they lie under the two Anterior Clinoid processes, so as to be almost hidden by them:—The two lines going from the letter, (*m*) mark the two wide grooves, which are formed by the Carotid Arteries as they rise by the sides of the Sella Turcica; and the letter (*m*) itself sits upon a large groove made by the Optic Nerves, where they enter into the Optic Holes.

SECOND DIVISION.

This division shows points of the SPHÆNOID also, but chiefly of the TEMPORAL BONE, and of the Corner of the PARIETAL BONE.

SPHÆNOID BONE.

(*n*) Shows the Foramen Lacerum under the Wing of Ingrassias, by which all the smaller nerves enter into the socket for furnishing the eye-ball. (*o*) Shows behind that, the Foramen Rotundum for the nerve of the upper jaw: (*p*) The Foramen Ovale for the nerve of the lower jaw:—and (*q*) shows the Spinous Hole, which is large here that it may be seen, (for naturally it is extremely small,) and the Groove formed by the great artery of the Dura Mater as it enters by this spinous hole, is also seen here (*r*) marked very hard and strong.

PARIETAL BONE.

It is upon the corner of the Parietal Bone, that this groove (*r*) is formed by the artery of the Dura Mater.

TEMPORAL BONE.

The point of the Petrous Portion of the Temporal Bone is seen here projecting into the basis or floor of the cranium. The point of the triangular Petrous Portion is marked (*s*); and the Internal Auditory Hole, by which the auditory nerve or 7th nerve enters into the ear, is marked (*t*).

THIRD DIVISION.

In this third division nothing almost but the Occipital Bone is seen; and its parts are these.—(*uu*) The two great hollows in which the lobes of the cerebellum lie.—

(*v*) is

(*v*) is the Ridge betwixt these two hollows, which rises very high, is called the Internal Spine of the Occipital Bone, and has a small falx (somewhat like the larger one) attached to it. (*w*) Marks the Foramen Lacerum, or wide irregular hole betwixt the Temporal and Occipital Bones, through which the Lateral Sinus passes to go down into the neck, where it forms the Great Internal Jugular Vein. And the 8th pair of nerves, or Par Vagum, accompanies the vein through this hole. (*x*) Stands upon the very middle of the Cuneiform or Wedge-like Process of the Occipital and Sphænoïdal Bones; for the two bones meet here, without any determined or regular limits for either.—And (*y*) stands in the centre of the Foramen Magnum, by which the Spinal Marrow goes down into the canal of the Spine.

FIGURE II.

THIS drawing explains the Basis of the Scull, as it is turned towards the neck and throat. But this surface is so rough, irregular, and confused, that it will not bear that fair arrangement and complete enumeration of processes which the first figure bears. The surfaces chiefly to be observed, and which may serve in some degree to arrange the subject, are 1st, The JAW and PALATE BONES. 2^d, The Root of the TEMPORAL BONES. 3^d, The LOWER PART of the OCCIPITAL BONES.

1. About the Palate we observe,

- (*a*) The Alveolar Process of the upper Jaw Bone, robbed of many of its teeth; (*b*) the Palate Plate of the Upper Jaw Bone, forming a chief part of the roof of the mouth; (*c*) the Palate Plate of the proper Palate Bone, which forms nearly one third of the Palate; (*d*) the Transverse Palate Suture, which runs across the Palate, joining the Palate Bone to the Palate Process of the Jaw Bone; (*e*) The Middle or Longitudinal Palate Suture, which joins the bones of the opposite sides; (*f*) the Foramen Incisivum, or Anterior Palatine Hole, lying just behind the first cutting teeth, and common to both bones; (*g*) the posterior Palatine Hole, which permits
the

the Palatine Nerve and Artery, to come down from the back of the nostrils to the Palate.

The backs of the nostrils are formed by the rising plates of the proper Palate Bones, and by the Pteregoid Processes. At the back of the nostrils, we see, (*h*) the Vomer, so named from its resemblance to a plough-share, and standing exactly in the middle, for it is the partition of the nose; (*i*) the Outer Pteregoid Process, forming the back of the nostrils; (*k*) the Hook of the Inner Pteregoid Process, upon which the tendon of the Tensor Palati Muscle turns: and a small tip of the Palate Bones, which is at this point covered by these Pteregoid Processes of the Sphæmoid Bone, is named, the Pteregoid Process of the Palate Bone. And (*l*) marks the appearance outwardly of the Wedge-like Processes of the Occipital and Sphæmoidal Bones.

2. About the roots of the Temporal Bones we have,

(*m*) the Root of the Zygomatic Process, where the Condyle of the lower Jaw plays; and (*n*) the Ridge just before the Condyle, upon the top of which the Condyle stands, in a dangerous situation, almost out of the socket when the jaws are opened wide; and which it slips over, getting into the hollow for the Temporal Muscle, when the lower jaw is dislocated. (*o*) Is the Mamillary, and (*p*) the Styloid Process, of the Temporal Bone. (*q*) Is the Oval Hole of the Sphæmoid Bone, for transmitting the great nerve of the lower jaw. (*r*) Is the Spinous Hole of the Sphæmoid Bone, for admitting the artery of the Dura Mater. (*s*) Is the hole near the point of the Temporal Bone for the Carotid Artery. (*t t t*) The Crucial Ridges of the Os Occipitis.—(*u*) The Posterior Tuber, or the Acute and Prominent Point of the Occipital Bone.—(*x*) The Additamentum Suture Lambdoidalis, which joins the back corner of the Temporal to the Occipital Bone.

The Zygoma, as formed by the Zygomatic Processes of the Temporal Bone, and of the Cheek Bone, is marked (*y*); and the hollow under the Zygoma for lodging the Temporal Muscle and the branch of the lower jaw to which that muscle is attached, is marked (*z*); and is seen in this view on both sides full and large.

SUPPLEMENTARY

SUPPLEMENTARY EXPLANATION TO PLATE V. OF THE BONES.

HAVING, in doing the outline to this plate, found it possible to mark the points more correctly, I have added the following explanation in this supplementary page; and that they may unite easily with the first explanation, I repeat the essential points.

In the Upper Scull there are,

1. The Optic hole (*l*).
2. On each side of the letter (*m*), there is the likeness of a second Optic hole, but it is merely the impression which the last turn of the Carotid Artery makes.
3. (*n*) Is the Foramen Lacerum.
4. (*o*) Is the Foramen Rotundum.
5. (*p*) Is the Foramen Ovale.
6. (*q*) Is the Spinous Hole.
7. (*z*) Marks the round Hole by which the Carotid Artery enters the scull, after winding through a crooked canal in the Temporal Bone, about an inch in length.
8. The figure (8.) points to a great breach in the rocky part of the Temporal bone; this breach is occasioned by the falling away of the Cartilaginous part of the Eustachian Tube. Therefore this wide breach is found in every Church-yard scull; and the hole for the Carotid Artery marked (*z*), opens where this breach ends.
9. It is observed of the great hole marked (*w*), for the passage of the Jugular Vein, that it is large and irregular; that it is almost divided into two openings, by a small projecting point; the line extending from the letter (*w*), touches exactly this small point.

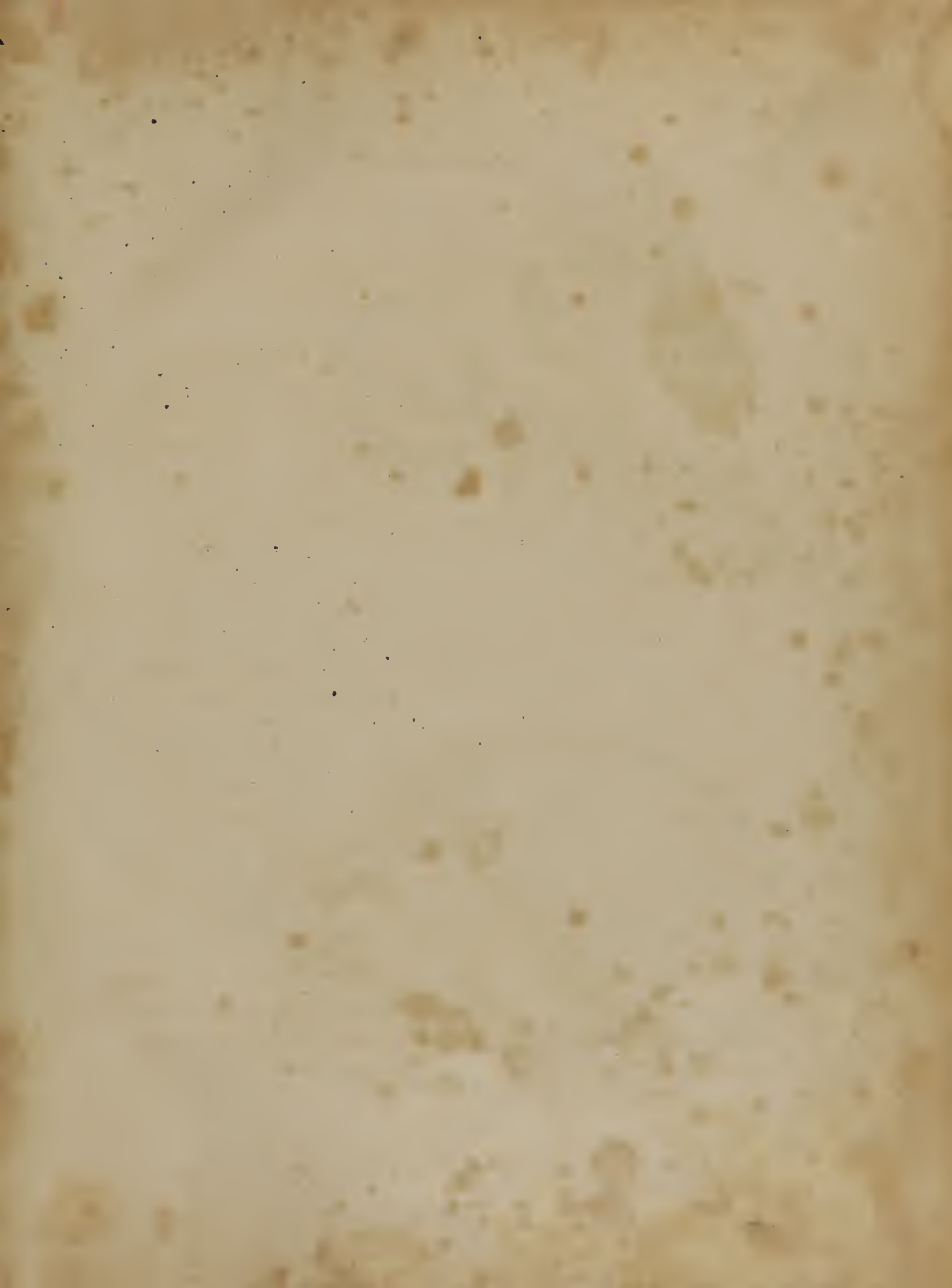
point. The eighth pair of nerves passes in the smaller opening before the point, the Jugular Vein passes in the greater opening behind it; a small bridle of the Dura Mater goes across from this point, and makes the two holes distinct in the fresh skull, and defends the eighth pair of nerves from the pressure of the Jugular Vein, when, (as often happens) it is turgid with blood.

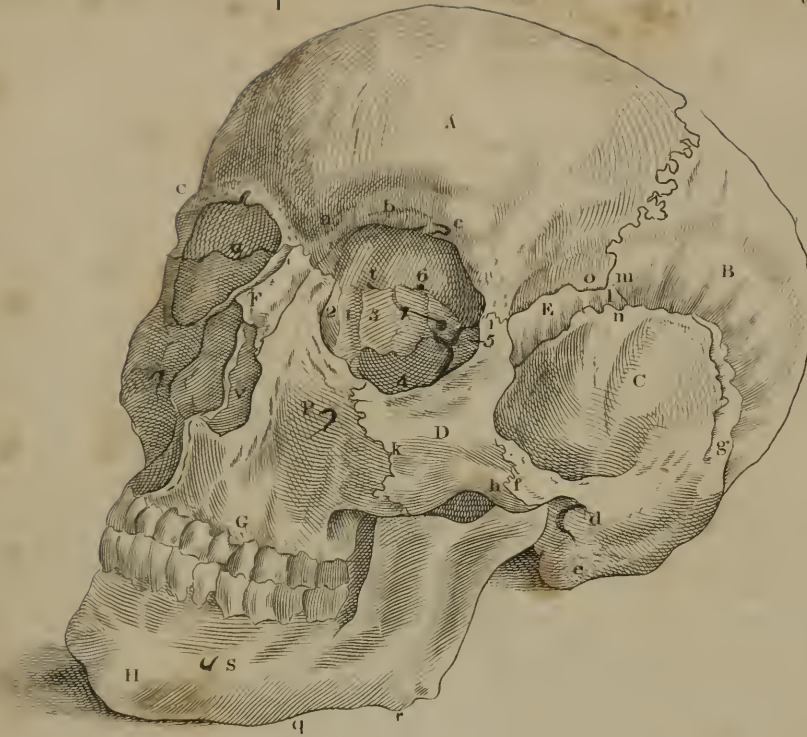
10. The number (10.) marks the hole under the Condyle by which the ninth pair of nerves, the Lingual Nerve, goes out.

In FIGURE II. the chief points are these,

- (*f*) Marks the Anterior Palatine Hole.
- (*g*) Marks the Posterior Palatine Hole.
- (*h*) The Vomer, or bone forming the partition of the nose.
- (*i*) The outer Pteregoid Process.
- (*k*) The Inner Pteregoid Process.
- (*l*) The Cuneiform Process of the Occipital Bone.
- (1.) Marks the Foramen Lacerum, not that which is marked (*n*) in figure i. but another Foramen Lacerum belonging also to the orbit, not for the transmission of nerves, but for the lodging of fat.
- (*q*) Marks the Foramen Ovale.
- (*r*) The Spinous Hole.
- (2.) Is that great breach which is left by the fading of the Cartilaginous end of the Eustachian Tube.
- (*s*) Is the hole for the passage of the Carotid Artery, which as on the inside of the skull opens immediately behind the breach.
- (3.) Marks the great Thimble-like hole, by which the Lateral Sinus comes out from the Skull, to form the great Jugular Vein.
- (4.) Is a hole seated behind the Condyle, the hole marked (10.) in figure i. is before the Condyle, and gives passage to the ninth or Lingual pair of nerves; this smaller hole is behind the Condyle, and gives passage to a small vein of the neck.

PLATE

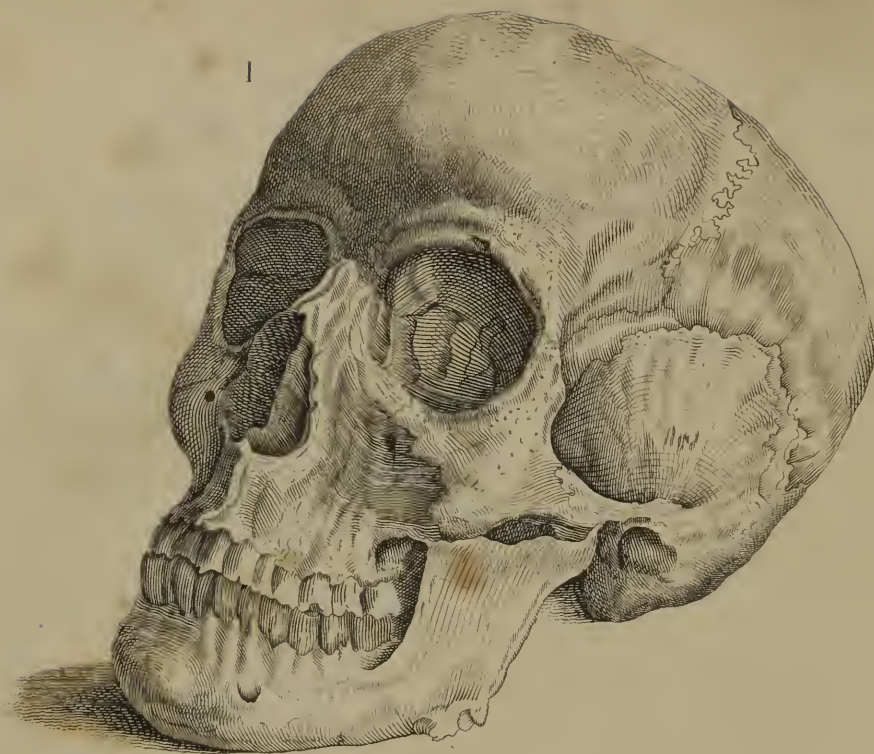




II



I



II

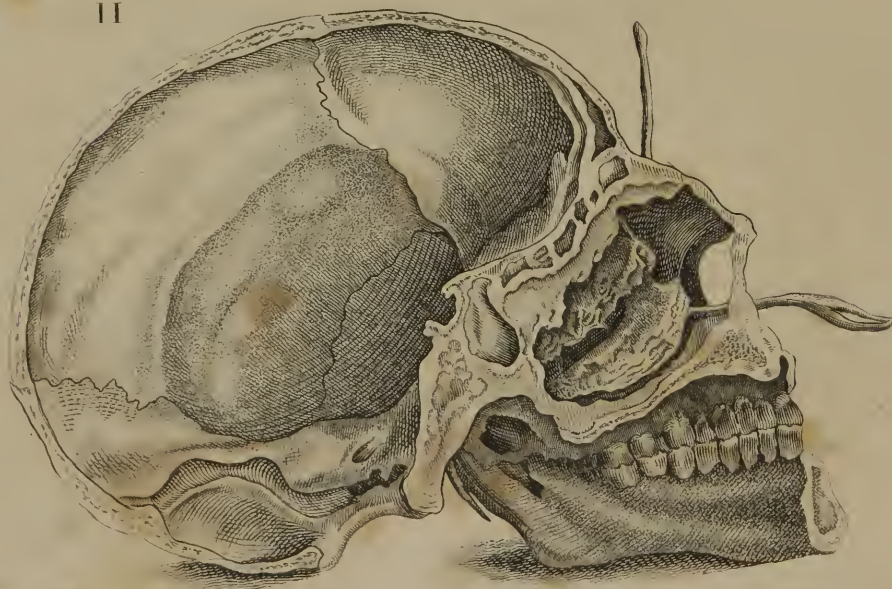


PLATE VI.

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*This Plate explains the Text Book, in all the Chapters upon the Skull.*  
 ~~~~~

GIVES 1st, a general view of the CRANIUM, the reverse of the first plate; and 2d, a vertical section of the Cranium, which shows the relation and bearing of many important parts,—explains particularly the great train of sinuses or cells, which make all the basis of the Cranium hollow,—explains also the spongy bones,—the Antrum Highmorianum,—the Nasal or Lachrymal Duct,—and the Mouth of the Eustachian Tube, which is seen here stuffed out, and dried, to make its opening immediately behind the nostrils at the back of the palate more distinct.

FIGURE I.

OUTSIDE OF THE SKULL.*

A. THE OS FRONTIS; where (a) marks the bump of the Frontal Sinus; (b) The Superciliary Ridge, dotted with marks of its Nutritious Arteries; (c) The Superciliary Notch, and hole which the Frontal Nerve and Artery make.

B. The

* Let the reader remember that there cannot be a perfect correspondence of figures through all the plates; that no more could be attempted in the anatomy of the Bones, (a subject so irregular

- B. The Parietal Bone, and the letter is so placed as to mark that semicircular ridge where the Temporal Muscle arises.
- C. Marks the Temporal Bone. Where (*d*) marks the Meatus Auditorius; (*e*) the Mastoid Process; (*f*) the Zygoma; and (*g*) a Double Squamous Suture, as in the skull from which this was drawn.
- D. Marks the Cheek bone where all its connections are seen; (*h*) with the Temporal Bone; (*i*) with the Frontal Bone; (*k*) with the Upper Jaw Bone.
- E. Marks the Wing of the Sphænoid Bone, where it lies in the Squamous Suture; and the four corners of bone forming the Squamous Suture, are (*l*) the corner of the Sphænoid; (*m*) the corner of the Parietal; (*n*) the corner of the Temporal; and (*o*) the Corner of the Frontal Bone.
- F. Marks the Small Bone of the Nose, where the middle Nasal Suture is seen.
- G. Points to the Upper Jaw Bone. The letter is placed upon the Alveolar or Socket Processes; and the small letter (*p*) marks the Infra Orbital Hole.
- H. Marks the Lower Jaw Bone, this letter touching the point of the chin; while the small letter (*q*) marks the line of the basis of the lower jaw; (*r*) the mark of the Masseter Muscle, the point into which it is inserted; (*s*) the Mental Hole by which a twig of the lower Maxillary Nerve comes out upon the face, just as the twig of the upper Maxillary Nerve comes out upon the face by the Infra Orbital Hole at (*p*).

In the Orbit, (*t*) marks the holes, which being within the orbit, (for arteries and nerves passing down into the nostril,) are called INTERNAL ORBITARY HOLES, to distinguish them from the Supra Orbital and Infra Orbital Holes. Of these internal Orbital

irregular) than just to make each plate systematic and orderly in itself, without reference to any other plate. And so in each plate the great letters point to the general Bone, and the lesser alphabet marks and arranges the individual parts.

Holes,

Holes, one is named the ANTERIOR, the other is named the POSTERIOR, Orbitary Hole. So that in this drawing, there are seen all the holes around the Orbit, viz. (*r*) the Supra Orbitary Hole, or Superciliary Hole; (*p*) the Infra Orbitary Hole; and (*t*) the internal Orbitary Hole. In the Orbit is seen (*u*) the Transverse Suture on the right side pure; on the left side also it is seen, but appears very irregular, as it really is, for it joins together a great many irregular bones.

Within the orbit some other parts are also seen here, which are not so well explained in any other plate.—The whole constitution of the orbit is seen;—(1.) Marks the Os Unguis in its plain part, where the eye rolls upon it.—(2.) Marks the Groove of the Os Unguis, where the nasal duct lies; (3.) the Os Planum, which is in fact the plain side of the Ethmoid bone as seen Plate III. Fig. III. at (*e*). (4.) Is the Orbitary Process of the Upper Jaw Bone. (5.) Is the Orbitary Process of the Sphænoid Bone, which is exactly opposite to its Temporal Ala or wing (*E*.) (6.) Is the Orbitary Plate of the Frontal Bone, which forms far the greater part of the Orbit; and (7.) at the bottom of the Orbit is the Optic hole.

In the Nose, the letter (*v*) denotes the Vomer, the bone which forms the partition of the Nose.

FIGURE II.

THE VERTICAL SECTION OF THE SKULL.

A IS the Frontal Bone; where (*a*) marks the Coronal Suture seen from within like a mere crack, and not serrated or zig-zag, as on the outer surface of the skull; (*b*) marks the small projecting Spine, to which the falx is attached, and which projects sometimes half an inch, making it impossible to trepan safely at this point; (*c*) the Orbitary Process, or plate, which lies over the eye; (*d*) the Bump marking

PART I. K ing

ing the Frontal Sinus or cavity. (1.) The cavity or sinus itself, with a cross bar in it, as there commonly is.

B The Inner Surface of the Parietal Bone; with the Artery of the Dura Mater, or rather its impression or furrow seen.

C The Inner Surface of the Occipital Bone; where (*e*) marks the Winding Groove of the Lateral Sinus; (*f*) that Groove ending in the thimble-like cavity, and the thimble-like cavity ending in its turn in the Foramen Lacerum, by which the sinus gets out; and there passes along with it through this wide slit, the Par Vagum, or eighth pair of nerves. (*g*) Marks the thickness of the bone, at the place of the Crucial Ridge; (*h*) its thinness, where it is loaded and pressed by the lobes of the brain. (*i*) Shows the section of the Foramen Magnum. (*k*) Marks the Cuneiform Processes of the Occipital and Sphænoidal Bones.*

D Marks the Temporal Bone, where (*l*) points out the Foramen Auditorium Inter-
num, where the Auditory Nerve enters; and (*m*) marks the Styloid Process.

G Marks the Upper Jaw Bone, where it forms the Palate.

H Marks the Lower Jaw Bone, where (*n*) is the section, showing the Cancelli of the Lower Jaw; (*o*) is the angle; and here upon the internal surface of the angle, the Pteregoid Muscle is implanted; (*p*) the hole by which the proper nerve of the Lower Jaw, the inferior Maxillary Nerve, gets into the heart of the bone; and there going round, accompanied with an artery, a branch of each is given off to every tooth; and what remains of the Nerve and Artery after this, comes out by the Mental hole upon the chin.

The curious parts seen in this section are;—The CELLS, SPONGY BONES, and the EUSTACHIAN TUBE.

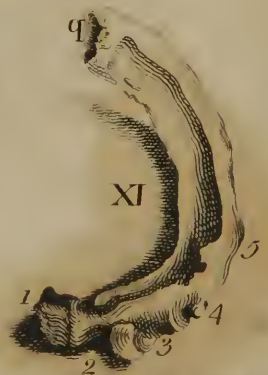
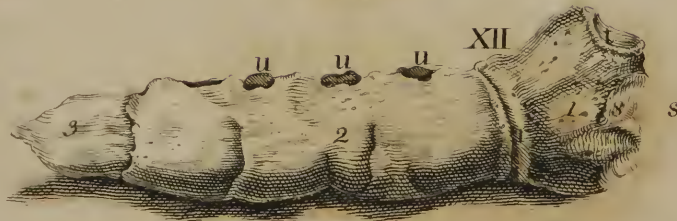
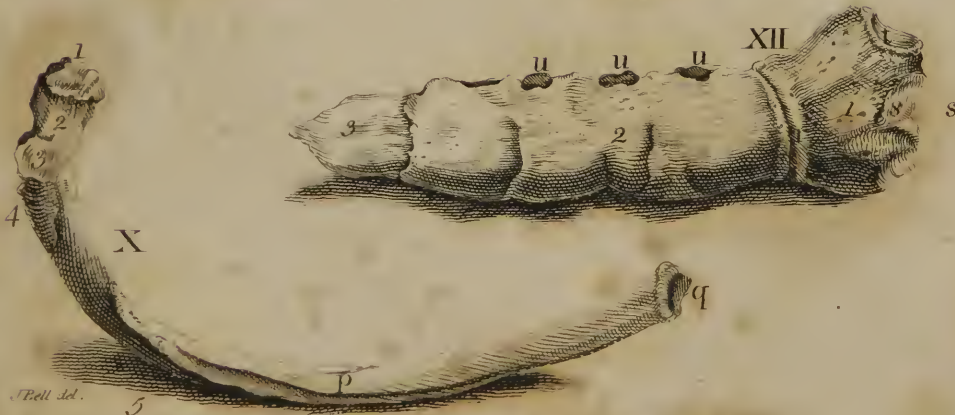
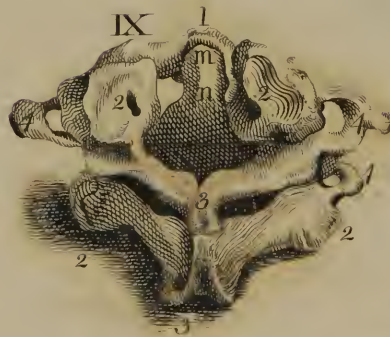
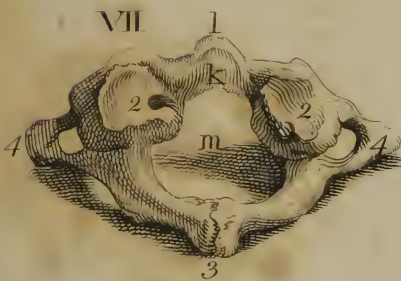
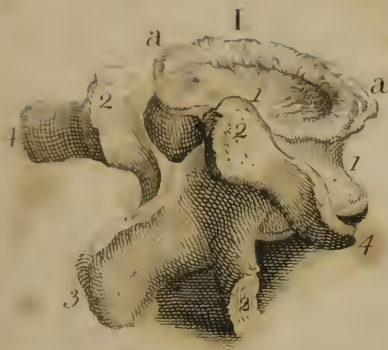
* There are two Foramina Lacera or wide holes, one belonging to the Sphænoid Bone, in the bottom of the socket for the eye; and this one betwixt the Temporal and Occipital Bones, in the basis of the Scull over the neck or implantation of the vertebræ.

The Cells are marked (1, 2, 3;) for (1.) Marks the beginning of this long train of cells, being the cells of the Frontal Bone, commonly called the Frontal Sinuses, communicating with each other, and with the nose. (2, 2, 2,) Mark the Cells of the *Æthmoid* Bone lying under the Cribriform Plate, and seen here by the cutting away of the *Os Planum*. (3.) Marks the Great Sinus of the Sphænoid Bone. It was pretty large in this skull, and is known to belong to the Sphænoid Bone, by the Sella Turcica and Clyneid Processes, which are seen in profile above it.

(*q*) Marks the back part of the Septum Nasi left; and looking past that, into the nostril, the Spongy Bones are seen; (*r*) the Upper Spongy Bone is already described as a mere process of the *Æthmoid* Bone, hanging thus downwards into the top of the nostril: (*s*) the Lower Spongy Bone, is an independent separate bone; small, as is expressed Plate IV., and hooked upon the edge of the Antrum Maxillare at this part; the opening of the Antrum is here marked (*s*).

The Lachrymal Duct is marked by the probe, (*t*) passed upwards from the nostril, and it is seen, by the direction of this probe, that the duct opens into the nose, just under the point of the Lower Spongy Bone.

The Eustachian Tube is a large internal passage to the ear; which opens at (*u*) just behind the back part of the Palate, and at the back opening of the nostril: here it is well expressed, the drawing being taken from a skull which had the cartilaginous opening of the tube stuffed out and dried.



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PLATE VII.

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*This Plate explains the Text Book, from page 105, to page 129.*  
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EXPLAINS the VERTEBRÆ, with all their processes and parts; and as the same parts return in each Vertebra, the several Vertebræ ought to be explained rather by ranks and orders, than as individual Bones.

 FIRST ROW.

The first row, consisting of Figures I, II, and III, is drawn for the purpose of contrasting the three classes of Vertebræ, viz. the Vertebræ of the Back, of the Neck, and of the Loins.

FIGURE I.

REPRESENTS a Vertebra of the Loins; and the peculiarities of the Lumbar Vertebræ are these.

- (1.) The body is large and broad, thick, spongy and loose in its texture, and tipped with a ring, (a) of harder bone.
- (2.) The Articulating Processes, or, as they are called, the Oblique Processes, are large, for they have to bear much force; they stand directly upwards and downwards; the

four

four Articulating Processes, (the two upper, as well as the two lower,) are marked 2, 2.

(3.) The Spinous Process, is short, flat, very broad, and stands horizontally and directly out, so as not to embarrass the motions of the loins.

(4.) The Transverse Process is short, direct, and very strong; and the Articulating Processes (2, 2) go off from the root of it.

In each Vertebra, there is formed by the roots of the Transverse and Oblique Processes, where they arise from the body, a ring or circle of Bone, which is in each drawing marked (*); it is for containing the Spinal Marrow.

FIGURE II.

IS a VERTEBRA of the BACK; where,

(1.) The body is shorter, and is a large segment (viz. nearly two thirds) of a small circle.

(2.) The ARTICULATING PROCESS is small and flat, and a little inclined, but not very oblique.

(3.) The Spinous Process is long, aquiline, depressed to such an angle that the two Spinous Processes almost touch each other, (as is seen in Fig. IV.) (3. 3.) and allow of but a very limited motion.

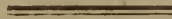
(4.) The Transverse Process is long, stands directly outwards, or is inclined a little upwards, and upon every dorsal vertebra there are two marks for the articulation of the ribs; one (*b*) on the side of the vertebra itself, or rather betwixt the bodies of two vertebræ, for the proper head of the rib, (Fig. X. and XI.) (1.); and again there is another articulating surface (*c*) upon the face or fore part of the Transverse Process, which is for the articulation of the little knob (Fig. X. and XI.) (3.) upon the back part of each rib.

FIGURE

FIGURE III.

THE CERVICAL VERTEBRA has these chief characters,

- (1.) The body is small, firm, and of more solid and condensed bone than in the vertebræ of the loins or back.
- (2.) The Articulating Process is truly oblique.
- (3.) The Spinous Process is short, and is forked.
- (4.) The Transverse Process is short, forked, and has a large hole in it for a great artery of the brain, which by its passing through this canal of the vertebræ is named Vertebral Artery.



SECOND ROW.

This Row explains chiefly the connections of the VERTEBRÆ.

FIGURE IV.

SHOWS the manner in which one Dorsal Vertebra sits down upon another, so that the Articulating processes (2. 2.) check upon one another, and the Spinous Processes (3, 3) are seen to be long and aquiline, and lying so over each other as to prevent all motion backwards or forwards, while the ribs limit the motion to either side. But in this drawing the one Spinous Process is tilted up from the other a little, owing to the want of that intervertebral substance which should lie betwixt the bodies. The hole is seen here at (*d*) betwixt the two vertebræ, by which a nerve goes off at the interstice between each vertebra: so there are in all twenty-four nerves of the Spine, corresponding with the number of Vertebræ in the Spine.

FIGURE

FIGURE V.

TWO Dorsal Vertebrae are here seen in their right position, connected by the intervertebral substance; with the end of one rib in its place; and at (*b*) is seen one articulating surface on the body of the vertebra naked. At (*c*) is seen the articulating surface, upon the face of the Transverse Process, naked. At (*d*) is seen the head of the rib covering the two articulating surfaces; connected at (*e*) with the body, and at (*f*) with the Transverse Process of its own vertebra.

FIGURE VI.

IS a drawing of the INTERVERTEBRAL SUBSTANCE, which is of that ambiguous nature, that anatomists choose this name, to avoid the dilemma of calling it either Cartilage or Ligament, when it has not the character distinctly either of Cartilage or of Ligament. It is shown here as it is found betwixt the Lumbar Vertebrae; and the concentric circles of which it consists are better expressed towards the margin (*g*); but towards the centre, and especially in the very middle, it becomes soft, pulpy, the circles confused. The substance is so much softer in the centre, that there is almost a hole at (*h*); especially when the bone is allowed to spoil a little, as this one was. At (*i*) is seen a slight indication of the Spinal marrow, (which was also corrupted,) going down through the great hole of the vertebra.



THE THIRD ROW.

Explains the forms of the ATLAS and DENTATUS; the two Vertebrae by which almost all the motions of the head are performed. Fig. VII. explains the Atlas; Fig. VIII. explains the Dentatus; Fig. IX. shows the way in which the Atlas sits down upon the tooth-like process and oblique shoulders of the Dentatus.

FIGURE

FIGURE VII.

EXPLAINS the Atlas, or first Vertebra, where we find,

- (1.) The body entirely wanting, and the place of the body supplied by Articulating Surfaces (2, 2), so large as to give sufficient strength and thickness to the sides of the ring.
- N. B.* At the place where the body should be, there is at (*k*) a smooth Articulating Surface for the Tooth-like Process of the Atlas rolling. There is at (*l*) a little tip or point, which is tied by ligaments to the margin of the Occipital Hole; at (*m*) there is a sort of straitening in the ring, and at this point a ligament goes across the ring, dividing it into two, and holding firm the tooth-like process.
- (2.) The Oblique or Articulating Processes of this vertebra are oval, and of a converging form; and this peculiarity in their direction limits the motions of the head, so that it cannot turn, but only nod, upon the Atlas.
- (3.) The Spinous Process is wanting. A small knob represents the spinous process; and the want of this spine enables the Atlas to turn freely in circles upon the Dentatus.
- (4.) The Transverse Process, also ending in a little knob, and perforated by the large hole for the Vertebral Artery.

FIGURE VIII.

THE DENTATUS, where the points of description are,

- (1.) The whole body of the Vertebra, rising gradually towards the apex or point of its axis or tooth-like process, which is marked (*m*).
- (2.) The broad flat articulating surfaces, like shoulders, at the root of the tooth-like process; upon which the atlas rests and turns.

PART I.

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3. The

- (3.) The Spinous Process is short, thick, and forked.
 (4.) The Transverse Process short, knobby, and perforated with the Vertebral Hole.
 (n) Marks the Neck or Collar, the narrow part of the Tooth-like Process, where it is embraced by the Atlas;—and (m) marks the Apex or pointed extremity of the Tooth-like Process.—(o) Shows how deep the ring of this particular vertebra is, and how fairly triangular its great hole for the passage of the spinal marrow is.

FIGURE IX.

EXPLAINS the manner of connection betwixt the *ATLAS* and the *DENTATUS*; shows the ring of the Atlas set down upon the shoulders of the Dentatus;—and here all the parts are marked with the same numbers as in the other drawings.

FIGURES X. AND XI.

ARE DRAWINGS OF THE RIBS: where we see,—(1.) the Head of the Rib, by which it is joined to the body of the vertebra.—(2.) The Neck or straitening beyond the head.—(3.) The Tubercle by which it is articulated with the Transverse Process. (4.) Another little Tubercle, beyond this second articulating surface.—(5.) The Angle of the Rib, or the point from which it begins to bend forwards, (p) the Groove in which the intercostal artery lies. (q) The more spongy end of the rib, with a sort of rude socket, which receives the cartilage that joins it to the sternum.

FIGURE XII.

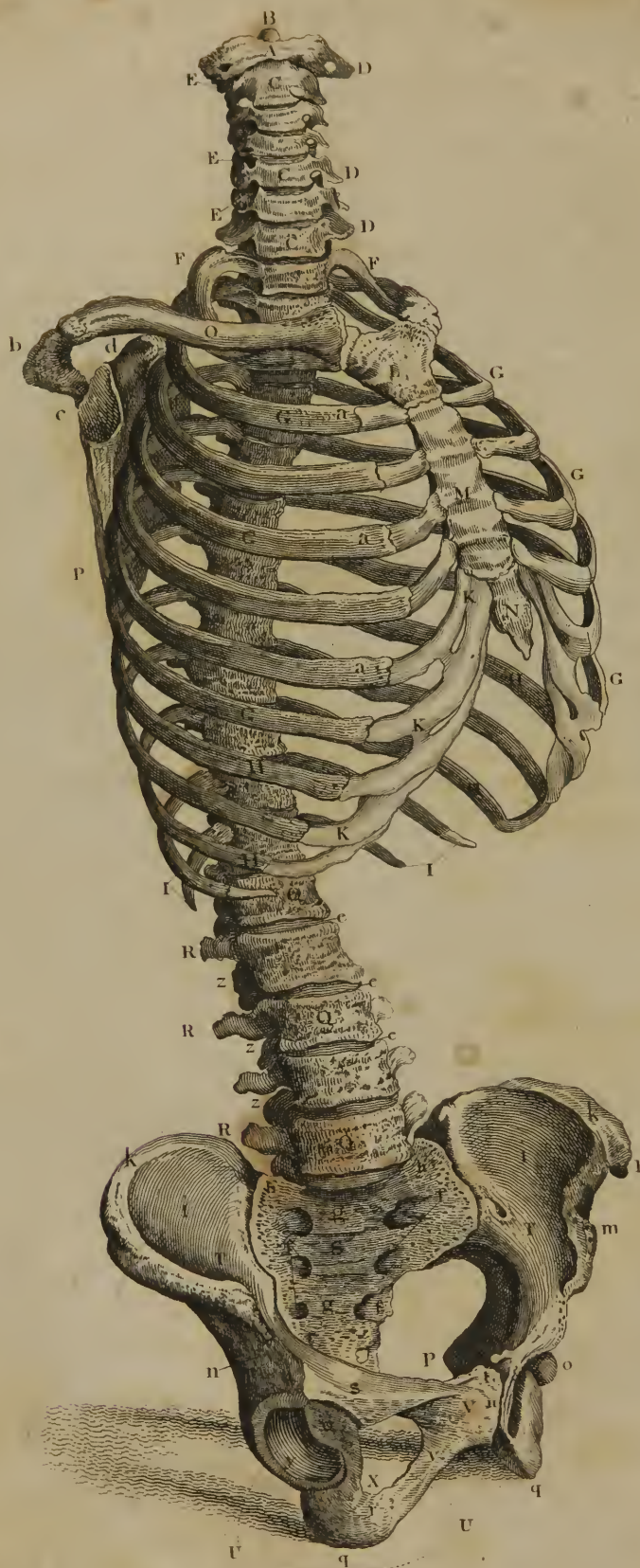
REPRESENTS the WHOLE LENGTH of the *STERNUM*.

- (1.) Marks the Upper Part of the Sternum; where (r) shows the pointed part of this
 first

first bone turned downwards to meet the second piece of the Sternum. (*s*) Is a hollow which makes way for the Trachea, &c. (*t t*) Are two articulating surfaces, by which the clavicle of either side is joined to this piece of the sternum.

(2.) The second piece of the Sternum, of great length, receiving the cartilages of most of the ribs; and the sockets for receiving the cartilages are seen, though not very fully, all along its edge at (*u u*), &c.

(3.) Is the Ensiform Cartilage, which in most bodies is straight pointed, as in this drawing, but sometimes bifurcated;—sometimes bent down, or on the contrary turned remarkably upwards; very seldom ossified, except in those persons who are extremely old.



J. Bell del

Jacob J. Necker Sc

PLATE VIII.

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*This Plate explains the Text Book, from page 105, to page 147.*  
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IS a general view of all the BONES OF THE TRUNK. It is chiefly useful by showing the general position of Bones which have been already minutely explained, and requires only a very loose and general explanation, because it is a general plate merely, upon which the parts and processes need not be minutely told.

A The Ring of the first Vertebra or Atlas.

B The Tip of the Tooth-like Processes of the Dentatus.

C The Bodies of the Cervical Vertebrae.

D Their Transverse Processes.

E The Holes betwixt the Vertebrae, by which the Cervical Nerves come out from the canal of the spinal marrow.

F The First Rib, lying flat and level here; and it is at this place, betwixt the clavicle and the first rib, that the subclavian vessels come out.

G The General Convex of the Thorax, formed by the middle of the ribs.—(a a a)
 Mark the ends of the ribs which receive the cartilages, by which the ribs are joined to the sternum.

G Marks the Seven True Ribs.

H Marks the three first False Ribs, whose cartilages run into the cartilage of the seventh rib.

I Marks

I Marks the Two Loose or floating Ribs, whose cartilages do not join the other cartilages, nor are united to the sternum; but stand out in the flanks, free and independent, their cartilages being buried in the thick flesh of the abdominal muscles.

K The Cartilages of the Ribs.

L The First or triangular piece of the Sternum.

M The Second or long piece, which receives almost all the Cartilages.

N The Third piece, as it is usually called; though it is merely Cartilage, to extreme old age.—This third piece N is the Cartilago Mucronata, Ensiformis, or Sword-like.

O The Clavicle, or Collar Bone, as it lies upon the top of the chest; and here it is seen how the bone by its proper position, keeps off and supports the scapula or shoulder-blades.

P Marks the lower border of the Scapula. (*b*) Marks the Acromian Process, to which the Clavicle is connected.—(*c*) Is the Glenoid or Articulating Cavity, for holding the shoulder bone; (*d*) is the Caracoid Process, showing how it projects on the inside of the joint, in the hollow under the arch of the Clavicle.—It is plain from this position of the process, that it should be felt on the breast just above the border of the Axilla.

Q The bodies of the Lumbar Vertebrae, thick and massy to support the weight of all the parts above.

R The Transverse Processes of the Lumbar Vertebrae, (*z z*) touch the Spinous Processes, where they appear in the interstices of the Transverse ones.—(*e e e*) Mark the intervertebral substances, or rather represent the putty, which is put betwixt the Vertebrae (in making our skeleton) to stand, in place of the intervertebral substance.

S The Os Sacrum; where (*ff*) represent the holes of the Sacrum disposed regularly in pairs.—(*g g*) Represent the white lines, which were cartilaginous in the child, dividing the Sacrum into five pieces, but are now consolidated into white lines of prominent bone particularly hard and firm.—(*h*) Represents the joining of the Sacrum to the Os Ilium at either side, which joining is named the Sacro-Iliac Symphysis.

T That

T That division of the Os Innominatum, which is called the Os Ilium; where (*i*) marks the hollow bosom of that expanded wing, which lying obliquely outwards like the wing of a chariot, is called the Ala Ilii: the Iliacus Internus Muscle, arises from this surface.—(*k*) Is the circle called the Spine or Ridge of the Os Ilium.—(*l*) Is the sudden sharp point, by which the Spine ends, and which is there named the Spinous Process, to which the name Anterior is added, to distinguish it from others, which lie concealed in the joining with the Sacrum. This Anterior Superior Spinous Process has another under it smaller and marked (*m*), which is called the Anterior Inferior Spinous Process.—It is merely a small Bump, over the top of the socket for the origin of the Rectus Muscle. (*n*) Marks the back or Dorsum Ilii, from which the Glutæi Muscles arise.

U U These two letters intersect all that part of the Os Innominatum, which is called Ischium; where (*o*) marks the body of the bone, where it forms a chief share in the socket. (*p*) Marks the Spinous Process, which is seen through the opening of the Pelvis projecting towards the Sacrum.—(*q*) Marks the Tuberosity or Bump of the Os Ischium, the lowest point of the Pelvis, and the part upon which we rest in sitting; and (*r*) marks the Ramus, or branch of the Ischium, as it rises to meet a like branch of the Pubis.

V Marks the third piece of the Os Innominatum, viz. the Pubis;—where (*s*) is the body, where it forms part of the socket for the thigh-bone;—(*t*) the highest point named Crista Pubis;—(*u*) points to the Symphysis Pubis, or joining of the opposite bones;—(*v*) marks the leg of the Pubis, descending to meet the leg of the Ischium. The Rami of the Ischium and of the Pubis form, with the other parts of the Os Innominatum; first the Arch of the Pubis;—secondly, the Thyroid Hole; and the Rami are said to meet one half belonging to the Pubis, and one half to the Ischium, because they are in fact separate in the child; a clear transparent cartilage, being interposed betwixt them.—(*x*) Marks this Thyroid Hole; and (*y*) marks the Acetabulum or socket for the thigh-bone.



PLATE IX.

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*This Plate explains the Text Book, from page 147, to page 158.*  
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REPRESENTS the THIGH BONE, TIBIA, and FIBULA.

FIGURES I. AND II.

REPRESENT the fore and back views of the THIGH BONE.—And in order that the letter press may proceed in the regular order of a little description or demonstration, the small figures are put upon each drawing; so that any number that is wanting on one drawing, must be found on the other.

The FIRST FIGURE shows the Back Part of the Thigh Bone, which is marked by our seeing here, from behind, the length of the neck of the bone;—the manner of its rising out of the two great processes, the Trochanters;—the projection and roughness of the Linea Aspera, and the deep hollow betwixt the Condyles.

The SECOND FIGURE, or the fore view, is exceedingly simple, having no strong marks. The Linea Aspera is turned almost out of sight. The chief peculiarity of the fore view is, that it shows the bending form of the bone.

PART I.

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THE POINTS OF DESCRIPTION ARE,

- (1.) The Body:—very thick, strong, of a cylindrical form, bending outwards with a gentle curve.
- (2.) The Head, which is very smooth, and very fairly circular. It is a large segment of a small circle, and is let pretty deep down into its socket. There is a dimple at (*a*), which marks the place where the central ligament once was.
- (3.) The Neck of the Bone, long, and almost horizontal, to set the shaft of the bone the wider off from the Haunch Bone, that it may move freely.
- (4.) The great Trochanter, a large bump or process for the insertion of the *Glutæi* Muscles.
- (5.) The lesser Trochanter, a smaller process, for the insertion of many muscles which move the Thigh Bone inwards.
- (6.) The Linea Aspera, or rough line, from which much of the Muscular flesh that covers the thigh arises.—And this Linea Aspera, or rough line, begins at (*b*) in a forking form from the roots of each Trochanter:—the two lines meet, and the Linea Aspera becomes single in the middle of the thigh, (*c*)—Towards its lower end (*d*) it forks again to go off towards each Condyle.
- (7.) The two Condyles, which form the great articulating surfaces of the Thigh Bone, where it lies in the knee-joint.—In Fig. II. we see that the inner Condyle (*e*) is the larger one; being larger to compensate for the oblique direction of the thigh bone. At (*f*) Fig. II. we see, covered with cartilage, the flat polished surface upon which the Rotula or knee-pan rolls.—And in Fig. I. at (*g*) we see the very deep notch betwixt the two Condyles, in which the crucial ligaments of the knee-joint lie.

FIGURE

FIGURE III.

THE TIBIA.

THIS is a drawing of the right TIBIA, seen from before. The upper end belonging to the knee is large and broad, and is likened to the trumpet end of a pipe.—The lower head belonging to the ancle is small, and has one projecting point, *viz.* that which forms the inner ancle, and which is thought to resemble the flute-mouth of a pipe. The whole bone has the triangular or prismatic form of the Ulna and Radius.

- (1.) Is the Upper head of the Tibia belonging to the knee joint; where (*h*) marks a little tubercle or rising, which divides the two articulating surfaces from each other. It is from the back part of this tubercle, that the cross ligaments of the knee joint arise. (*i i*) Mark the two lunar hollows, upon which the two Condyles of the thigh bone rest, and in which the semilunar or moveable cartilages of the knee joint lie. (*k*) Is that rough circle which bounds the articulating surface, and from which the Capsular Ligament arises. (*l*) Is the tubercle or bump of the Tibia, upon which we rest in kneeling, and into which the great fore tendon called the Ligament of the Patella is fixed: and (*m*) is the prominent ridge of the shin, which begins from this tubercle, and goes downwards in the waving form of an Italic *f*. (*u*) Is that part of the Tibia which receives the upper end of the Fibula.
- (2.) Is the middle part of the bone, which is of a triangular or prismatic form, and the figure (2) is repeated upon each of the three angles.
- (3.) Is the lower and smaller head of the Bone belonging to the ancle joint; where (*n*) marks the smooth hollow which receives the bones of the foot, and which is named (like the articulating surface of the Radius), the Scaphoid, or Boat-like Cavity of the Tibia. (*o*) Marks the projection or process of the inner ancle, which guards the joint, preventing luxation inwards. (*p*) Is the small cavity on the side of the Tibia, which receives the lower head of the Fibula, in the way that is represented in next plate.

FIGURE

FIGURE IV.

Is a drawing of the Fibula, which is a long slender bone, so extremely simple in its form, that there needs be no further description than this, that the shaft of the bone (*q*) is exceedingly slender,—is much longer than the Tibia,—and is triangular like the Tibia. The upper end (*r*) is laid under the projecting head of the Tibia, at (*u* Fig. III.) and it is laid flat upon it; so that this articulating and smooth surface (*r*) is smooth only for the sake of a very slight degree of shuffling motion.

The lower end (*s*) is the larger.—It unites with the lower end of the Tibia (*p* Fig. III.) to form the ancle joint. This guards the ancle joint without, as the Process of the Tibia guards it within. And this smooth articulating surface (*t*) is for receiving the side of the Astragalus, that bone of the foot by which chiefly the ancle joint is formed.





PLATE X.

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*This Plate explains the Text Book, from page 153, to page 166.*  
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EXPLAINS the CONNECTIONS of the TIBIA and FIBULA, and all the BONES of the FOOT and of the TOES.

FIGURE I.

SHOWS the TIBIA and FIBULA laid to each other as they lie in the leg; and here all the letters and figures, explaining the Tibia and Fibula of the last plate, are put upon the very same points; so that no new letters nor figures are required, except (*v*), to mark that space betwixt the Tibia and Fibula in which the Inter-osseous Membrane lies; and (*x*) to show the arch which is made by (*o*) the process of the inner ancle, and (*s*) the lower head of the Fibula forming the outer ancle: for the deepness of the arch, and the projection of these two points, show how very secure the ancle joint is; the smooth head of the Astragalus marked (*a* Pl. X. Fig. IV.) being received deep into this arch.

FIGURE

FIGURE II.

SHOWS the Outer Surface of the Rotula or Patella, which is rough, and marked with many points where its nutritious arteries enter.

FIGURE III.

SHOWS the Lower Surface of the Patella, viz. that which is turned towards the cavity of the joint; and here there is seen a rising line at (*) which lies in the great hollow betwixt the two Condyles;—while the two hollows on each side of this rising move upon the convexities of the Condyles. In short, this smooth inner surface of the patella is moulded as it were upon the surface marked (*f*) in the last plate, Figure II.

FIGURES IV. AND V.

EXPLAIN all the Bones of the Foot, viz. of the TARSUS or instep, of the METATARSUS, and of the TOES.

The bones of the Tarsus are seven in number, fewer and larger than the bones of the Carpus.

(1.) The Astragalus is that great bone which immediately forms the ancle joint;—where (*a*) marks the great ball or cartilaginous pulley which is received into the arch formed by the Tibia and Fibula.—(*b*) Is the flat side of the bone upon which the processes of the inner and outer ancles lie, embracing the joint closely.—(*c*) Is a little flat neck or projection which lies over the heel-bone.—(*d*) Is the neck of that large round head which makes a ball and socket joint with the Os Naviculare, which is marked (3).

(2.) The

- (2.) The *Os Calcis* lies under the *Astragalus*, and is the largest of the Tarsal Bones, supporting all the weight of the body; and here these points chiefly are seen.—(e) The tip of the bone, which looks upwards, receiving the *Tendo Achillis*, or great Back Tendon.—(f) The lowest rough point; the point of the heel upon which we stand.—(g) The head, by which the *Os Calcis* is joined to the *Os Cuboides*, marked (7.) the *Os Cuboides* being received at this part into a large hollow socket of the *Os Calcis*.
- (3.) Is the *Os Naviculare* or *Scaphoides*, which has been so named from its resemblance to a boat. But if there be any such resemblance it is effectually concealed in all these views. The *Os Naviculare* has rising edges and a fair round socket, which is turned towards the *Astragalus* (1.) to receive the large round head of that bone.
- (4, 5, and 6.) Are the Cuneiform or Wedge-like Bones; and in this view the square external surfaces chiefly are seen;—and these Cuneiform Bones, ought just to be reckoned simply according to their order, the first, second, and third cuneiform bones, beginning with that which supports the great toe.
- (7.) The *Os CUBOIDES* is a large square or cube-like bone, as its name implies, but by no means a regular cube.—It forms a large share of the Tarsus, and supports the Metatarsal Bone of the Little Toe.

The Cuneiform Bones are less easily understood, and I have therefore made a second drawing of the foot, FIG. V. (where the same letters and marks are still preserved,) in which I have shown the point of the Cuneiform Bones, the Metatarsal ones being taken away. In this figure the faces of the Cuboid and of the Cuneiform Bones are directly seen. And it is understood why they are called Cuneiform or wedge-like bones, for the upper surfaces marked (4, 5, 6,) are broad and square;—while their lower surfaces at (*) are small and pointed; these smaller ends of the wedges being turned inwards or towards the sole of the foot. In FIG. IV. (h) marks the five Metatarsal Bones; so named from their being placed on
the

the Tarsus.—(*i*) Marks the first rank or phalanx,—(*k*) the second,—(*l*) the third rank of the bones of the toes.

FIGURE VI.

SHOWS the foot in profile, and explains particularly well the large head of the Astragalus (*d*). These drawings are just half the size of nature, whence it may easily be understood how large this head of the astragalus is;—as large fully as the head of the shoulder bone:—and the socket of the Os Naviculare, (*3*), into which this head of the astragalus is received, is both larger and a deeper circle than the Glenoid Cavity of the Scapula, into which the head of the shoulder bone is received.

The manner in which the process (*c*) of the Astragalus is joined with the Os Calcis, (*2*) so as to allow of a shuffling motion, is also explained here. The great length of the first bone, or Metatarsal Bone of the great toe (*h*) is also to be observed, because it is sometimes to be cut away; and it should not be forgotten that it goes very deep into the foot.

The small bone, commonly called Sesamoid Bone, from its resembling, or being thought to resemble, a grain of Sesamum (though it is much larger), is seen here at (*m*) lying under the ball of the great toe, where it is connected with the tendons of the short flexor muscles of the great toe.—There are commonly two under the ball of each great toe, and there are occasional Sesamoid bones under the other toes, and sometimes under the great joint of the thumb.

The several Phalanges, as they are called, or ranks of bones in the toes, need not again be explained.

The only important point remaining to be explained, is the double arch of the foot; for there are two arches. First (*n*) the great and general arch;—the two points of which are the tip of the heel, and the ball of the great toe. These points alone of all the foot touch the ground.—The elasticity of this arch, proceeding from its numerous

is supported under the weight of the whole body, both by the particular ligaments belonging to the individual joints of the foot,—and more particularly by the Great Fascia or ligament, (I would call it,) of the sole of the foot, which from one point (the heel) extends to the root of each toe individually.

But there is also a second and particular arch, which the bones of the Tarsus form among themselves. This arch is explained by showing a large central hole, which is expressed in each of these drawings, and is marked (*o*).—In Fig. IV. there is only a darkness showing where this central hole is.—In Fig. V. the hole is seen fair (by the Tarsus being turned round) and is marked (*o*).—In Fig. VI. it is explained by a broken pencil, (*o*) thrust up through this central opening.

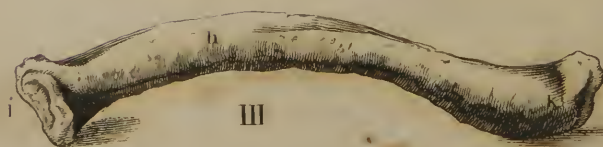
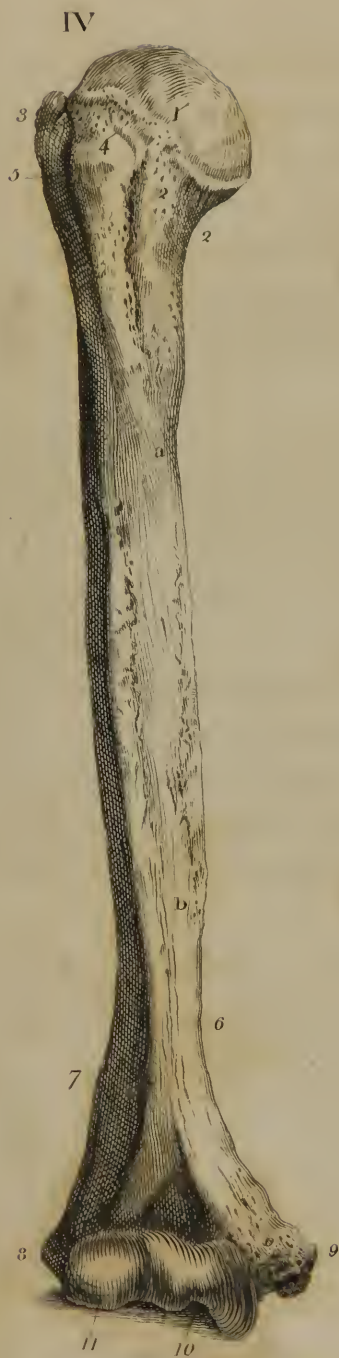


PLATE XI.

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*This Plate explains the Text Book, from page 166, to page 177.*  
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OF the SCAPULA, CLAVICLE, and ARM BONE.

FIGURES I. AND II.

EXPLAIN the Scapula, showing, 1st, its internal,—2dly, its external surface.

The Scapula or Shoulder Blade, is of a triangular shape. (*a*) Marks its flat surface, which is turned towards the ribs, hollow, to suit the convexity of the ribs.—And the letter (*a*) is repeated all over the surface, to show the little risings of this surface; for this is the part upon which the Sub-scapular Muscle lies; and these risings are the marks of its fibres.

(*b*) Shows the Outer Surface of the Scapula, which is in its turn a little convex;—is crossed by the Spine, or that high ridge (8) which divides it into two surfaces;—the lower surface (*c*) holding the infra-spinatus;—the upper surface (*d*) holding the supra-spinatus muscle.

THE LINES AND PROCESS OF THE SCAPULA ARE THESE;

(1.) Is the upper Costa or border of the Scapula, where (*e*) marks a notch, which is sometimes a complete hole, or when incomplete it is made out by a ligament. It gives passage to the Scapular arteries and nerves.

(2.) Is

- (2.) Is the Lower Costa or border, which is round, and at the place (*f*) gives origin to the Teres Major and Teres Minor muscles.
- 3.) This long side is called the Basis of the Scapula, and has the great Trapezoid and Rhomboid Muscles implanted into it from above and behind; while the Serratus Anticus is implanted into it from before and from below.
- (4.) Shows the Upper Angle which receives the Levator Scapulæ Muscle.
- (5.) The Lower Angle.
- (6.) The Glenoid or Articulating Cavity, which is particularly small and superficial, considering how large the head of the shoulder bone is.
- (7.) The Neck of the Scapula so called; it is the smaller part which supports the head, though, properly speaking, there is no neck;—and when the head of the shoulder bone is said, in a luxation, to lie upon the neck of the Scapula, it lies upon the place marked (*g*).
- (8.) The Spine of the Scapula, which divides the upper surface, and which, rising higher as it goes forwards, terminates at last in the Acromion Process.
- (9.) Is the Acromion Process; it is just the end of the spine, which turns its flat side towards the head of the shoulder bone, and overhangs the shoulder to defend the joint, and prevent luxations upwards.
- (10.) And there is still a farther security; for the Coracoid Process (10) stands upon the inner side of the joint, and defends it within. It is named Coracoid Process, from its being crooked like the beak of a crow.

FIGURE III.

EXPLAINS the Clavicle or Collar Bone: a bone which is extremely simple in its form, and has few or no parts;—and in which the letter (*h*) marks the middle, the roundest part of the bone, that point which is most prominent in the breast; the part most frequently broken. (*i*) Marks the end nearest the Thorax, and shows the

the circular articulating surface, by which it is joined to the Sternum; and under this end a small moveable cartilage lies. (*k*) Marks the outer end, or that which is turned towards the shoulder blade: the Clavicle is flattened at this end, and touches the Acromion by one single point only.

FIGURE IV.

THE Os Humeri, Shoulder Bone, or Arm Bone.

- (1.) The head is large,—flat,—is a small segment of a large circle,—seems quite disproportioned to its socket, (6. Fig. I. II.)
- (2.) Is the neck as it is called; though there is no proper neck; there being no length, nor narrower part betwixt the body and the head of the bone.
- (3.) The Greater Tuberosity.
- (4.) The Lesser Tuberosity;—the Greater and Lesser Tuberosities being two knobs, for the insertion of those muscles which come from the Scapula.
- (5.) Is the Groove betwixt these tuberosities, for the passage of the long tendon of the Biceps Muscle, which runs here as a rope does in its pulley.
- (a) Marks the roughness about one third down the arm bone, into which the tendon of the Deltoides is implanted.
- (b) Marks the place, where (a little below its middle) the Os Humeri turns flatter, because it is to terminate flat and broad, to favour the hinge-like joining of the bones of the fore arm; and
- (6.) Shows one ridge on the inner side of the arm bone;
- (7.) Shows another similar ridge or edge of the bone, on its outer side—each ridge running down towards its own Condyle.
- (8.) Is the external Condyle, smaller and less projecting, because it gives origin only to the extensors of the hand and fingers, a set of muscles which do not need much power nor the advantage of a long lever.

(9.) Is

(9.) Is the inner Condyle, which is very long and very prominent, to give a greater power to those muscles which bend the hand and fingers.

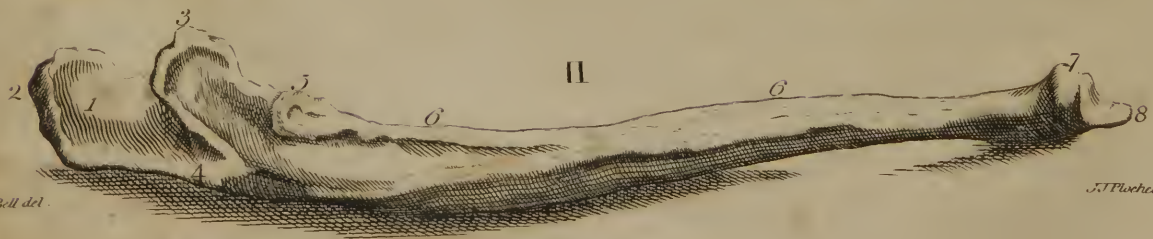
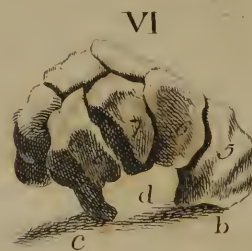
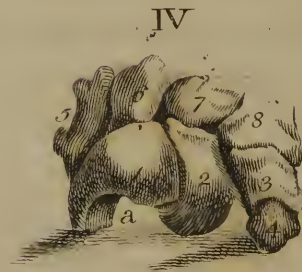
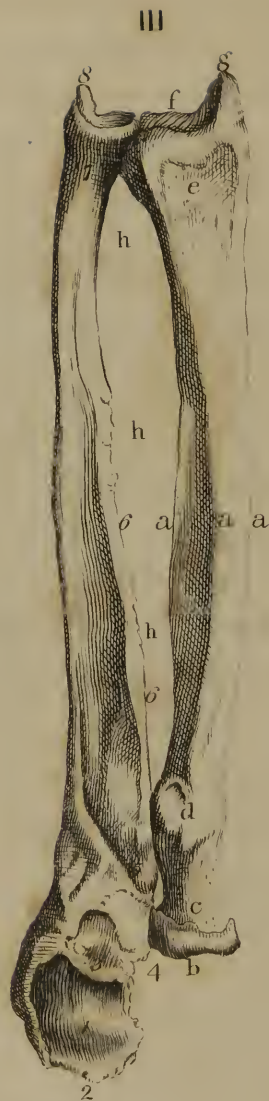
The elbow joint, being a very strict and limited hinge, has a long articulating surface:—and there are properly two surfaces, one for the Radius, and one for the Ulna.

(10.) Is the longer articulating surface, to which the Ulna is so joined as to perform none but hinge-like motions.

(11.) Is a neat small round knob, tipped with smooth articular cartilage; and to this small knob, the face of the button-like end of the Radius is applied; and by the roundness of this knob the radius is enabled to perform not only the hinge-like motions to accompany the motion of the Radius; but also its own free circular motions, by which the hand is carried round.

(12.) Is that very deep hole which the Coronoid Process of the Ulna checks into.

(13.) There is a similar one marked (13,) which belongs to the demonstration of the fore part of the shoulder-bone, and is to be seen by turning to the next plate.



J. Bell del.

J. T. Fischer sc.

PLATE XII.

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*This Plate explains the Text Book, from page 177, to page 190.*  
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EXPLAINS the RADIUS and ULNA, CARPUS and FINGERS.

FIGURE I.

IN the drawing of the Os Humeri, all the descriptions and letters belonging to the last plate belong equally to this. This drawing were superfluous, but for the important purpose of showing the back part of the articulating surface, where we do not find that round surface marked (11) in the last plate, and which is called the Lesser Head of the Humerus, but only the hinge-like surface for the articulation of the Ulna. And the chief object of this drawing, is to show, that here also upon the back part of the bone, there is a deep hollow betwixt the Condyles; on the fore part of the bone the hollow is for receiving the Coronoid Process of the Ulna, which checks into that hollow when the arm is bent forwards; but here upon the back part, this deep hollow marked (13,) receives the Olecranon, or great process of the Ulna, when the arm is extended. It is also to be observed, that in this drawing the twisted form of the bone is well expressed and truly, not caricatured; for the edge does in fact turn thus round.

FIGURE

FIGURE II.

THE ULNA.

THE Ulna is the longer of the two bones which lie in the fore arm. The whole bone is of a triangular shape, with three sharp edges; the upper end is larger, and belongs to the elbow joint; the lower or Little Head belongs to the wrist. The bone has these points of description.

- (1.) Is the great cavity, which receives the lower end of the humerus to form the elbow joint, and this is called the Greater Sigmoid cavity.
- (2.) The Olecranon, a large tubercle which marks the point of the elbow upon which we rest, and guards the Sigmoid Cavity behind.
- (3.) The Coronary Process which stands up, and guards the Sigmoid Cavity before.
- (4.) The Hollow, where the side of the smaller button-like head of the Radius rolls, called the Lesser Sigmoid Cavity.
- (5.) The Prominent Roughness, into which the tendon of the Brachialis Internus is implanted; and it leads to the sharp ridge.
- (6.) The Sharp Ridge, from which the Inter-osseous Membrane goes off.
- (7.) The Lower Head of the Ulna, which is small, and button-like; for it is received into a hollow on the side of the Radius, and it is upon this point, viz. the little head of the Ulna, that the radius turns in the continual motions of the hand.
- (8.) Is the Styloid Process of the Ulna, which is pointed, as the name implies; from it ligaments go off to strengthen the joint of the wrist.

FIGURE III.

EXPLAINS the relative position of the Radius and Ulna. The Ulna is marked with figures according with the above description; the Radius is also marked with its points of demonstration.

1. (*a. a. a.*) Repeated on the three sides of the Radius, explain the general triangular form of the bone, marking particularly its three edges.
2. (*b*) Marks the upper head of the Radius, flat, round, and button-like, with the side rolling upon the Lesser Sygmoid Hollow of the Ulna.
3. (*c*) The neck of the Radius or straighter part, which immediately supports the head.
4. (*d*) The Bump or Tubercle of the Radius, into which the tendon of the Biceps Muscle is implanted.
5. (*e*) The Lower Head of the Radius; the Bone is thus gradually enlarging towards its lower end.
6. (*f*) The Scaphoid, or boat-like Cavity on the lower end of the Radius for receiving the two largest bones of the Carpus;—forming the wrist joint.
7. (*g*) The Styloid Process of the Radius, which bounds the wrist joint towards the side of the thumb: and here it is seen how the little head of the Ulna (*7*) is received into the hollow socket on the side of the Radius.—The two sharp edges of the Radius and Ulna are opposed to each other, showing how the Inter-osseous Membrane stretches from the one bone to the other, filling up all the space marked (*h*). And it is here seen that the Radius is somewhat arched towards the Ulna, so as to roll round it without touching it, or hurting or disordering the numerous muscles, &c. which lie upon the Inter-osseous Membrane.

FIGURE IV.

EXPLAINS the Bones of the CARPUS or WRIST, as they are seen from the outside, or back of the hand.

The Bones of the Carpus are eight in number, they are divided pretty regularly into two rows;—and we rather choose to count and demonstrate them according to their rank, than as individual and separate bones: for as separate bones there is nothing very particular in any one; but by their combination and form, and as they relate to

the wrist joint, or to the fingers, it surely must be important, I should rather say, necessary, for the surgeon to remember them.

FIRST ROW.

FORMING THE WRIST JOINT.

- (1.) The Scaphoid Bone, where the figure (1.) marks the regular round surface, which forms a chief part of the ball and socket-joint of the wrist. And (a) marks the great hook-like projection of this bone, whence that strong ligament which braces down the tendons of the Carpus arises.
- (2.) The Lunate Bone, where the figure is so placed as to mark the large ball-like surface of this bone which joins with the Os Scaphoides to form the ball of the wrist. And the lunate part of the bone is concealed, when thus joined with the others.
- (3.) The Cuneiform Bone, of which only the broad or square surface is seen on the back of the wrist, while the narrower part of the wedge is in the palm.
- (4.) The Pisiform Bone, so named from its roundness, this bone is a little removed from the direction of the row to which it belongs.

SECOND ROW.

RECEIVING THE METACARPAL BONES.

- (5.) The Os Trapezium; or first bone of the upper row named Trapezium, from its square and angular form. It has the ball of the thumb planted upon it, and the figure points directly to that socket which receives the thumb.

(6.) The

- (6.) The Trapezoides, so named from its resemblance to the last.
- (7.) Os Magnum, for it is the greatest; and it has a curious head which is in this view concealed under the Os Lunare; for the head of the Os Magnum is received into the semicircular hollow of the Os Lunare, forming a ball and socket joint with that bone.
- (8.) The Os Unciforme, or hook-like bone; the hook of which is towards the palm, and therefore not seen in this view.
- N. B.* In this drawing of the Carpus, Fig. IV. this group of bones is made to rest chiefly upon two of the corner bones, viz. the hook of the Os Scaphoides, and the Os Pisiforme.

FIGURE V.

IS also drawn chiefly with the intention of explaining the carpus; and here the same numbers may serve, for the position of the Carpus is very little changed.

- (1.) Is the Scaphoid Bone. (2.) The Lunar Bone, forming with the Scaphoid the ball for the wrist joint. (3.) The Os Cuneiforme. (4.) The Os Pisiforme is out of sight. (5.) The Trapezium which supports the thumb; (6.) (7.) (8.) The Trapezoides, Magnum, and Unciforme, supporting all the other fingers; and here the Os Magnum (7.) is seen a little fuller; so that the round head of it can almost be seen jointed with the Os Lunare. The 1st, 2d, and 3d Phallanges or rows of bones belonging to the several joints of the fingers, need not be explained; and the round heads for the joints of these finger bones explain themselves.

FIGURE VI.

PRESENTS the Carpus in a new direction; showing those bones which are less perfectly seen in the other drawings;—and it is necessary to observe, that the group of the
Carpal

Carpal bones is now turned, so as to show that face of them which receives the Metacarpal Bones;—and the group now rests chiefly upon the points of the two upper Corner Bones, *viz.* the Trapezoid and Unciform Bones; as in the other view it rested upon the lower Corner Bones, *viz.* the Scaphoid and Pisiform Bones. So that here there is only the upper row fairly demonstrated, *viz.*—(5.) The Os Trapezium;—(6.) the Os Trapezoides;—(7.) the Os Magnum;—(8.) the Os Unciforme. (*b*) Marks a small pointed projection of the Os Trapezium, whence the Carpal Ligament arises.—(*c*) Marks the great Unciforme or hook-like process of the Unciform Bone, which is another point whence the same cross ligament of the Carpus rises.—(*d*) Marks the arch which the Carpal Bones make, and the Tendons of the wrist lie in this arch, and are bound down by the cross ligament crossing from the one corner point, to the other.

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